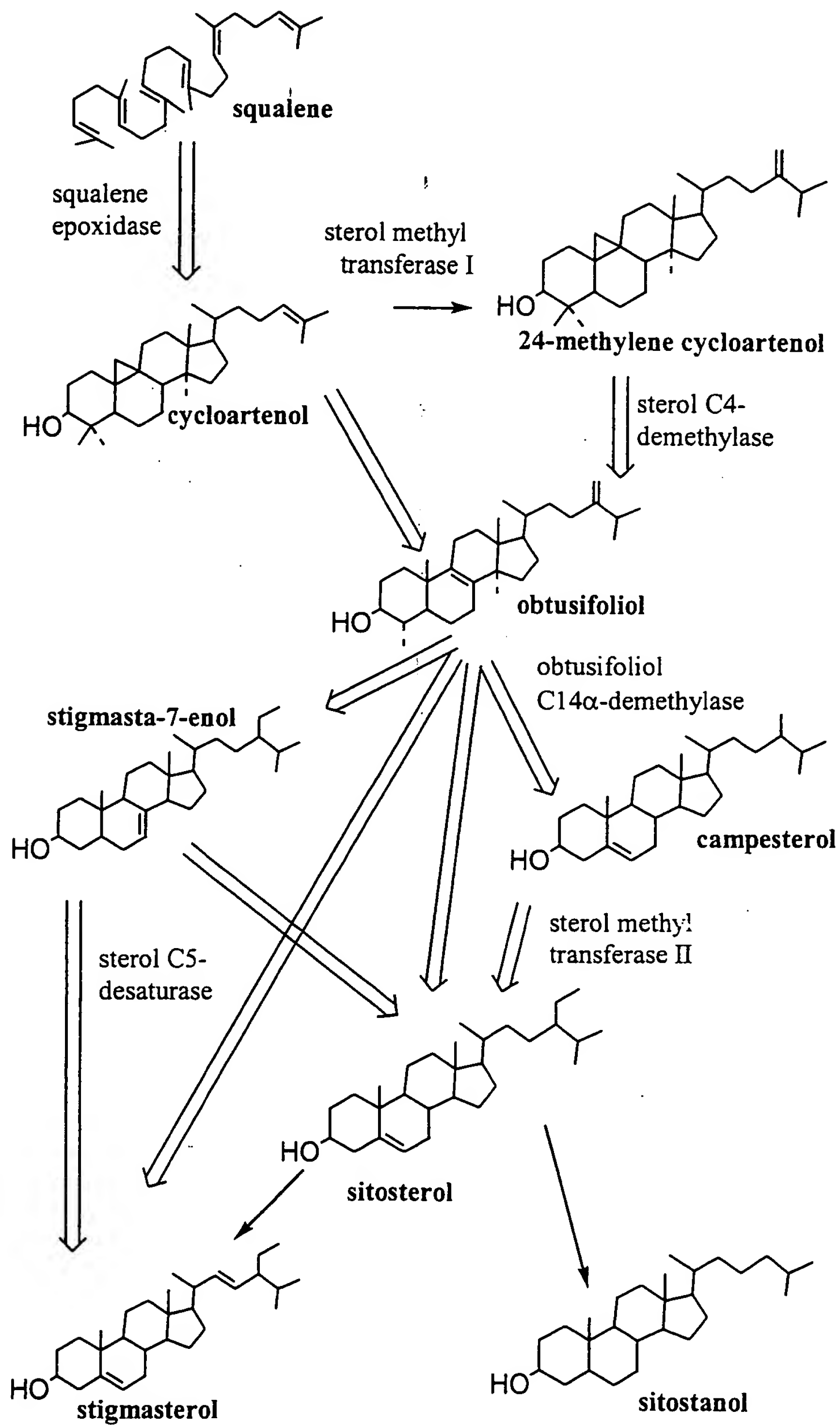


1/78

FIG. 1.



T00290" E2458860

Membrane spanning domain

ER Lumen

Cytosol

Linker region

NH

N-terminal region

Catalytic domain

COO

### HMGR N' truncation with linker

### HMGR N' truncation without linker

**N: N-terminal region**  
**L: Linker region**  
**CD: Catalytic domain**

**Figure 2: Forms of *Arabidopsis* and rubber HMGR1 tested in *Arabidopsis* and yeast to compare expression, activity and sterol production.**

**00000000000000000000000000000000**

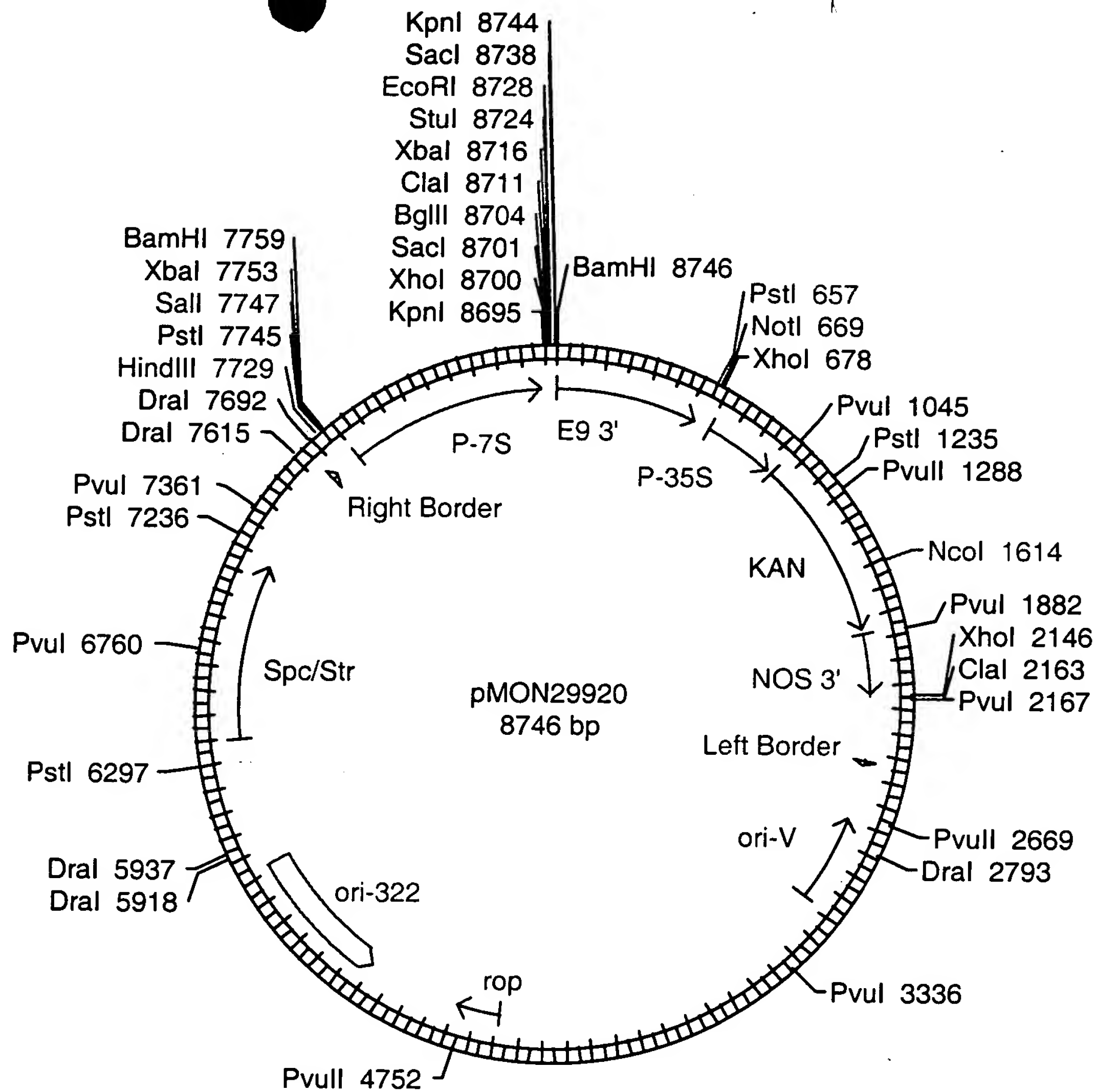


Figure 3: Construct pMON29920

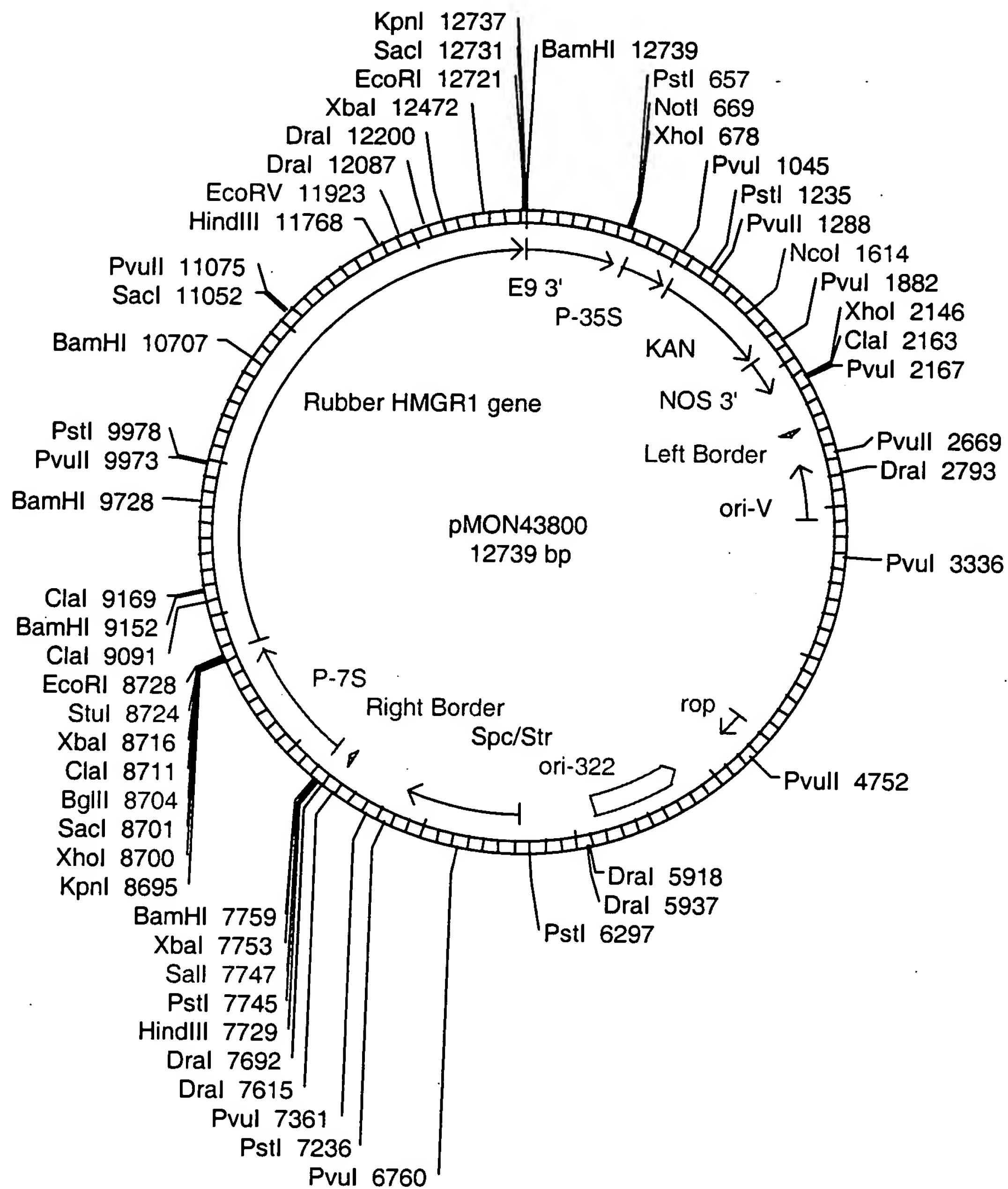


Figure 4: Construct pMON43800

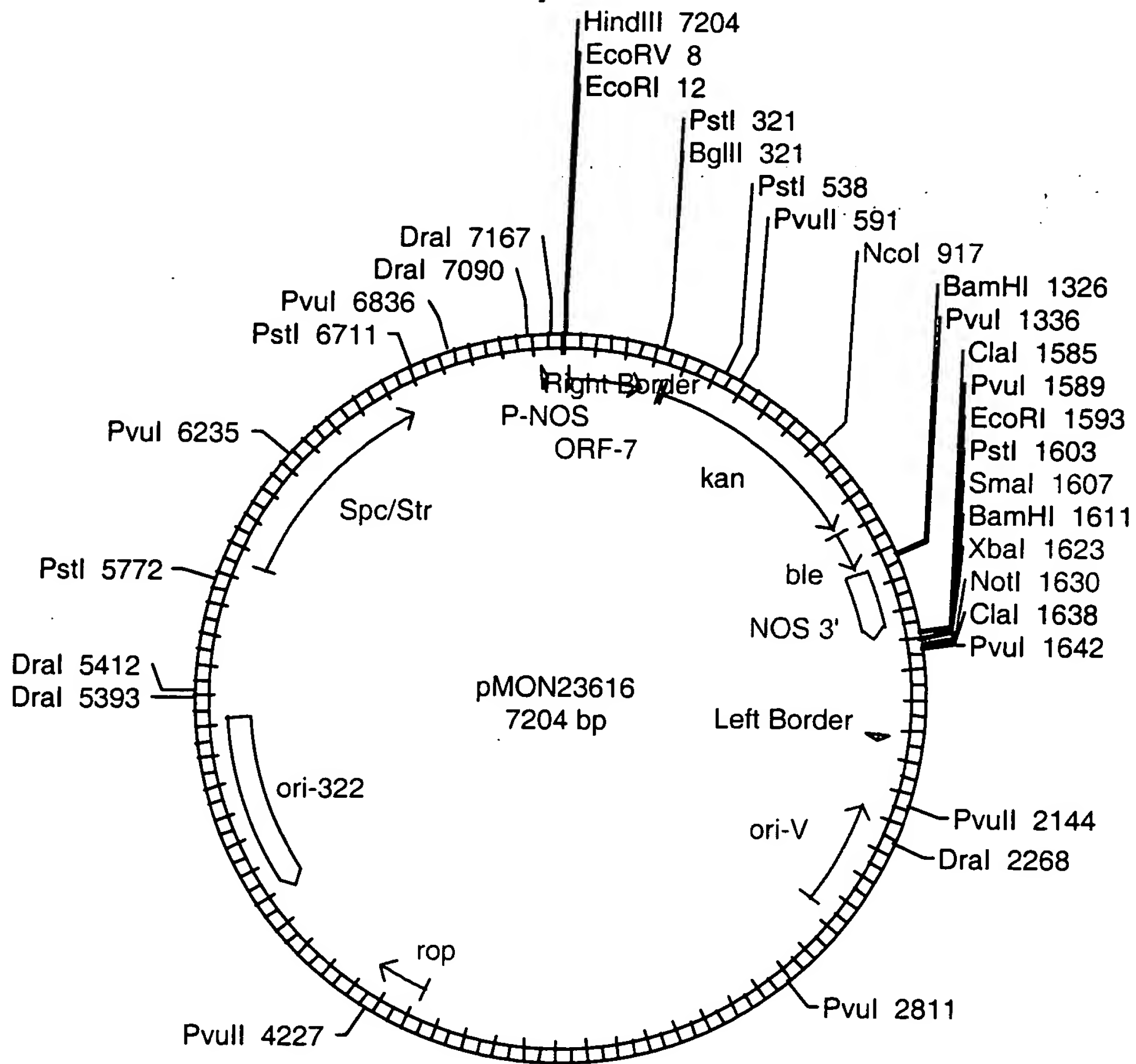


Figure 5: Construct pMON23616

098872-0601



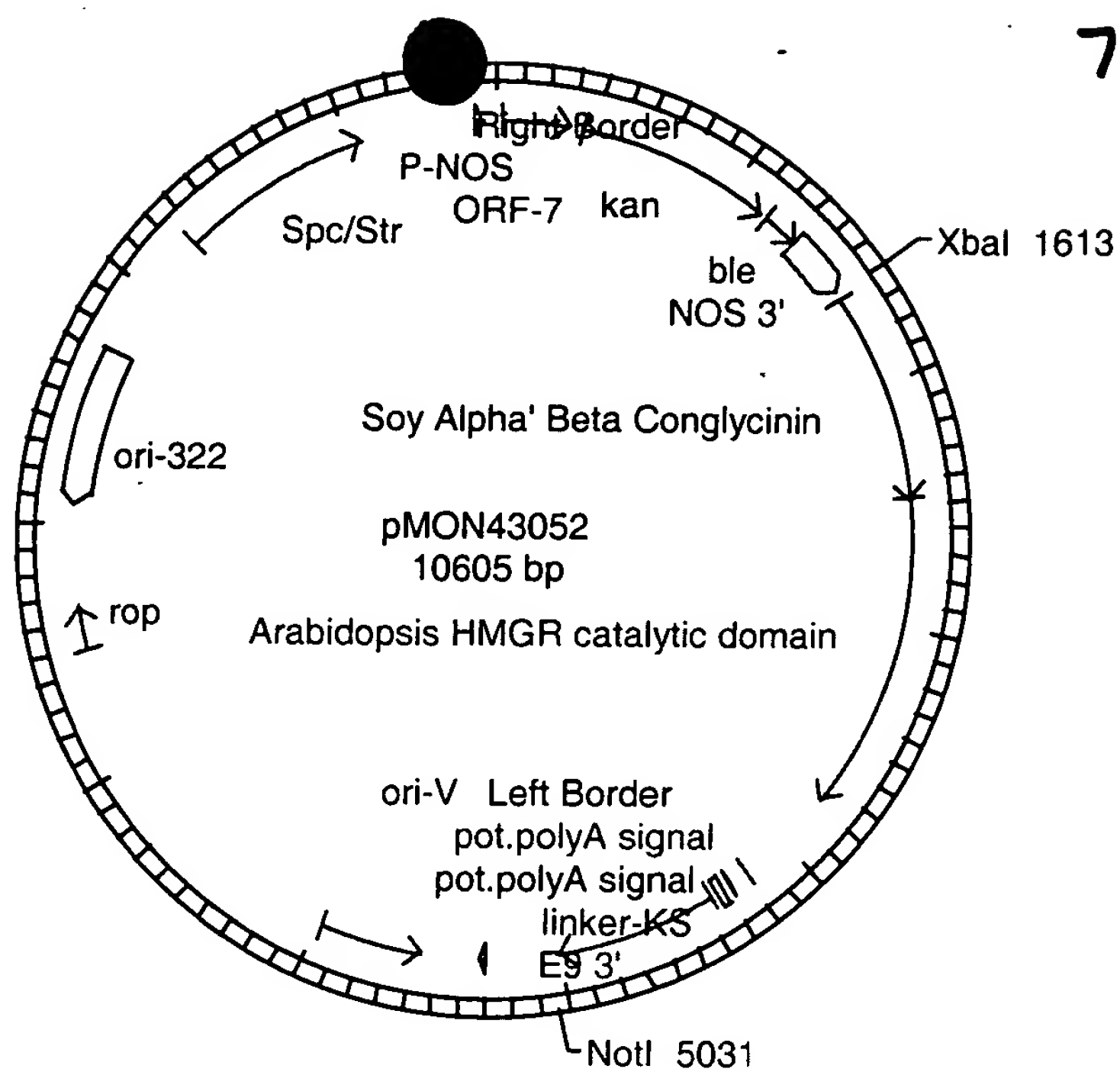


Figure 7: Construct pMON43052

2025-06-20 14:58:50

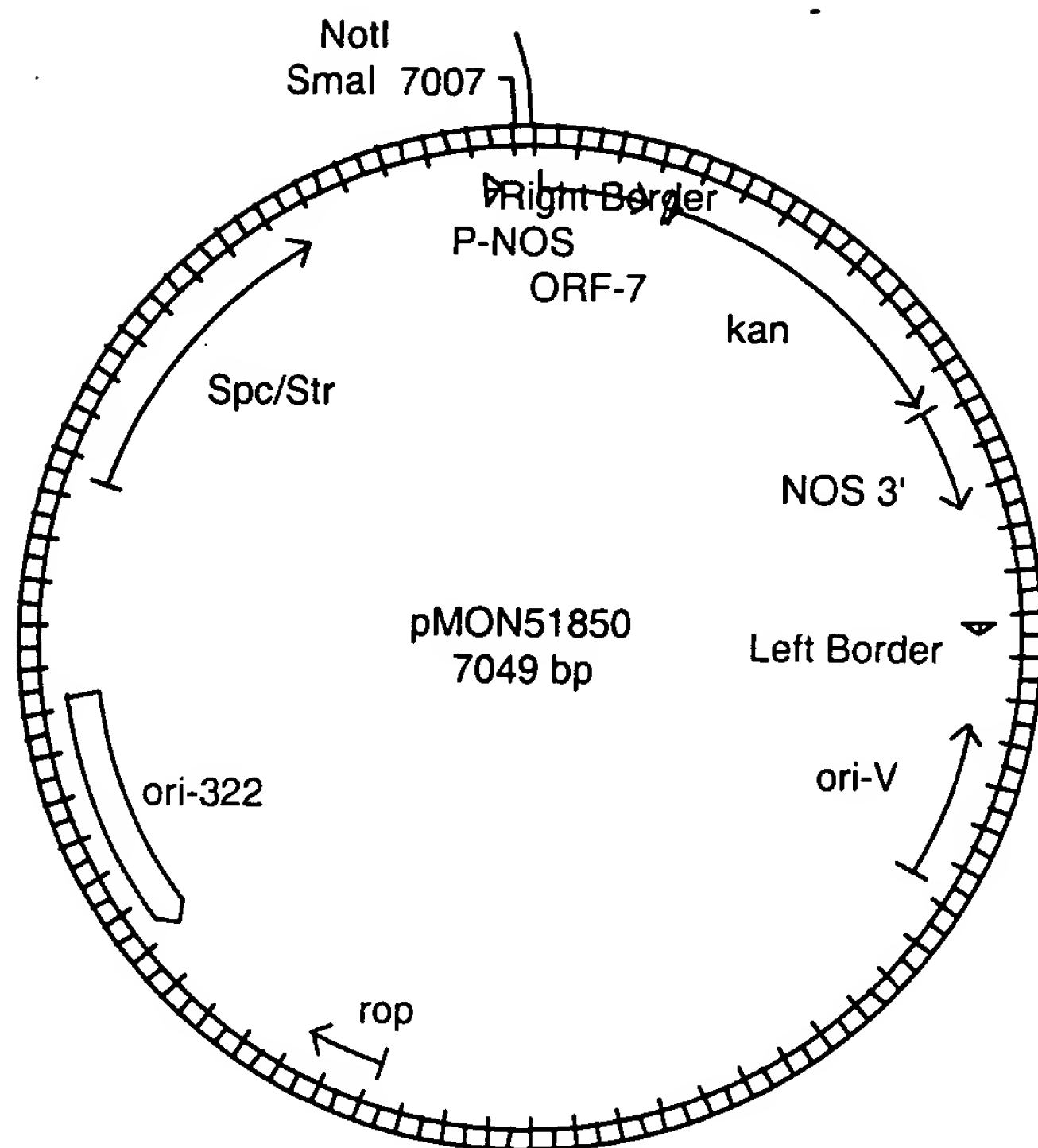


Figure 8: Construct pMON51850

05085723-062001  
T00290-02458350



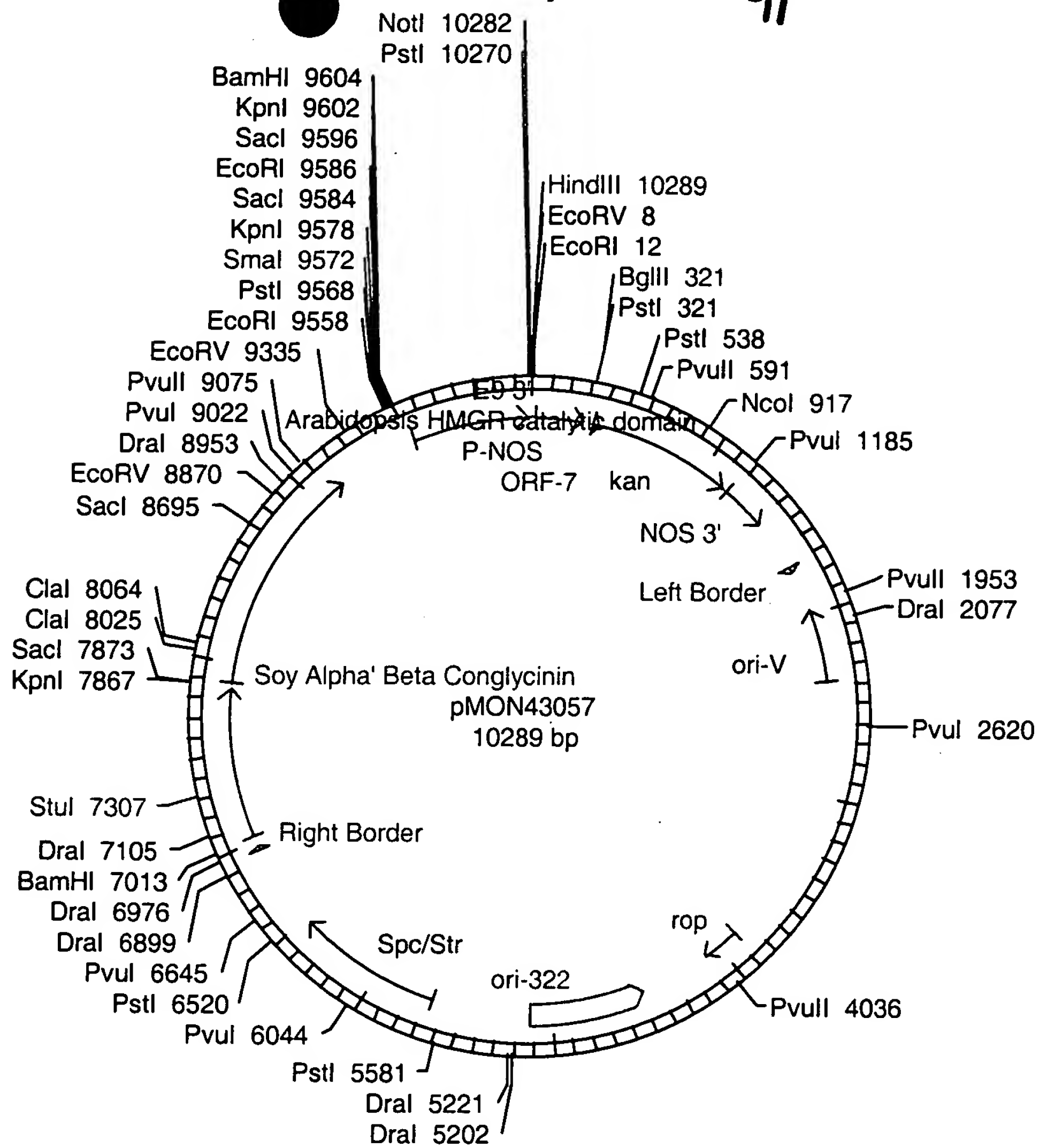


Figure 9: Construct pMON43057

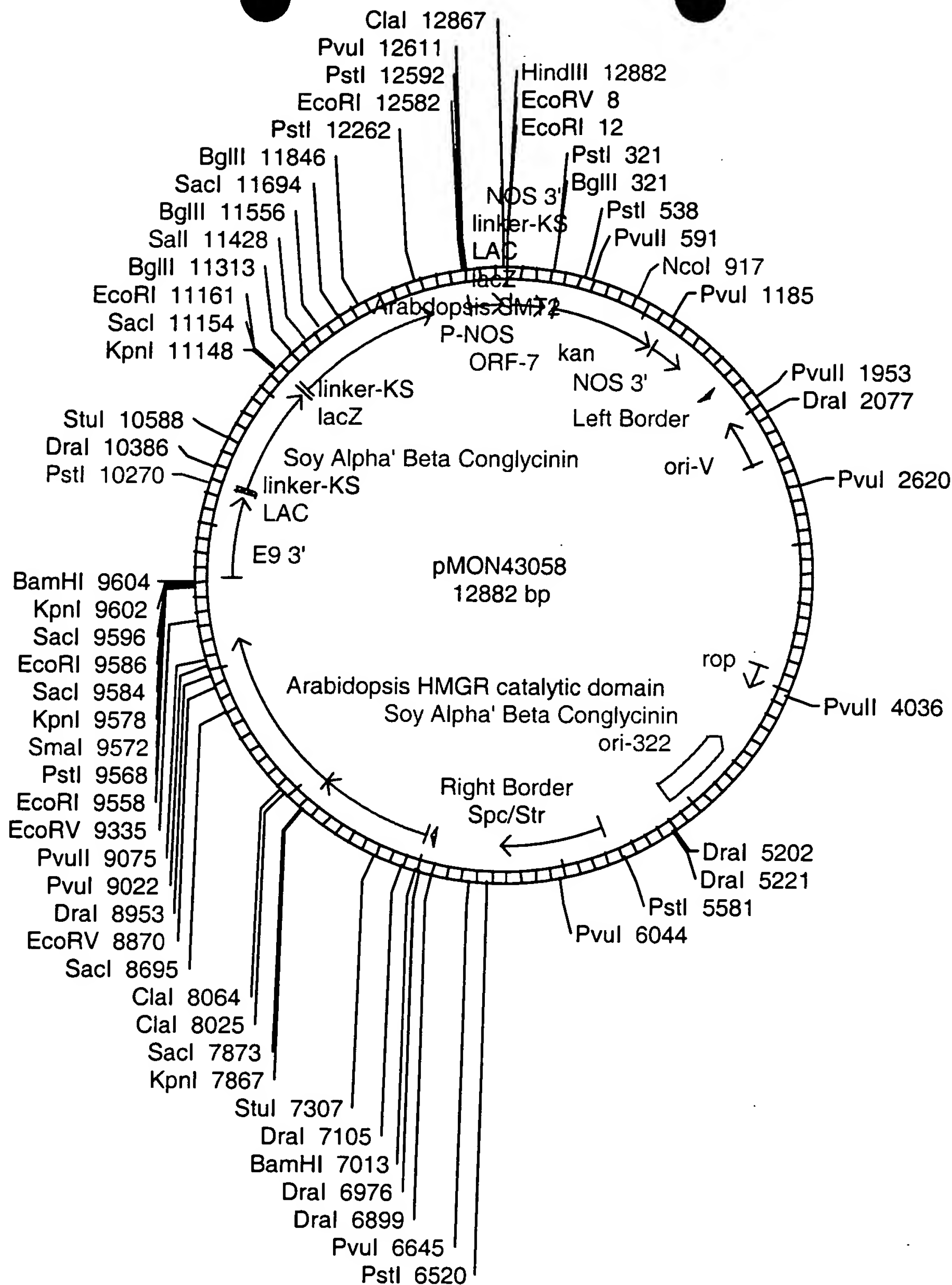
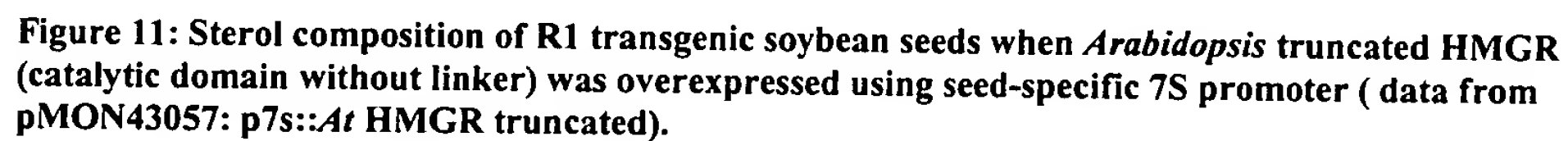


Figure 10: Construct pMON43058

**000000000000**





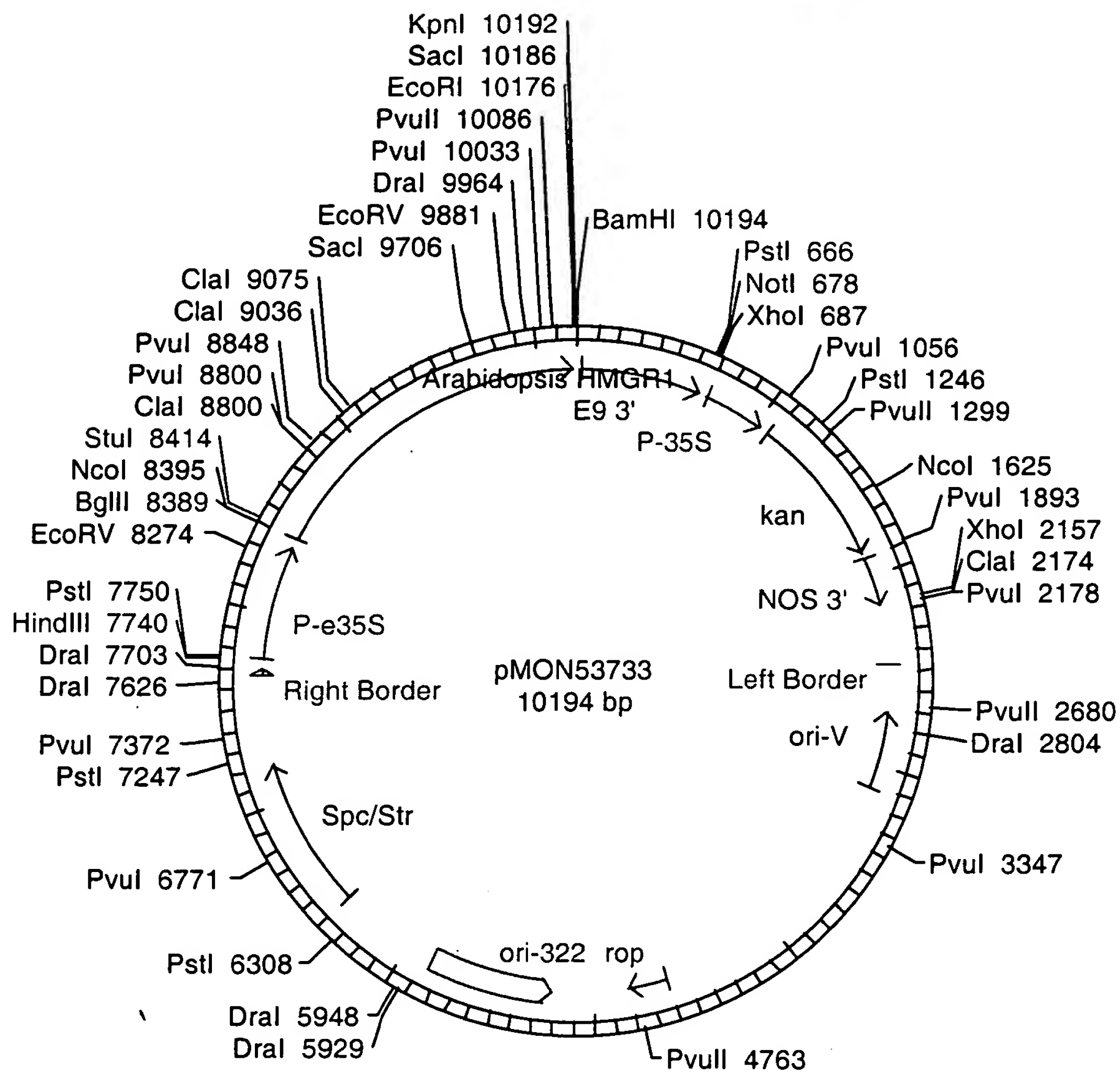


Figure 13: Construct pMON53733

0905723-06001  
100290"E225850

14/78

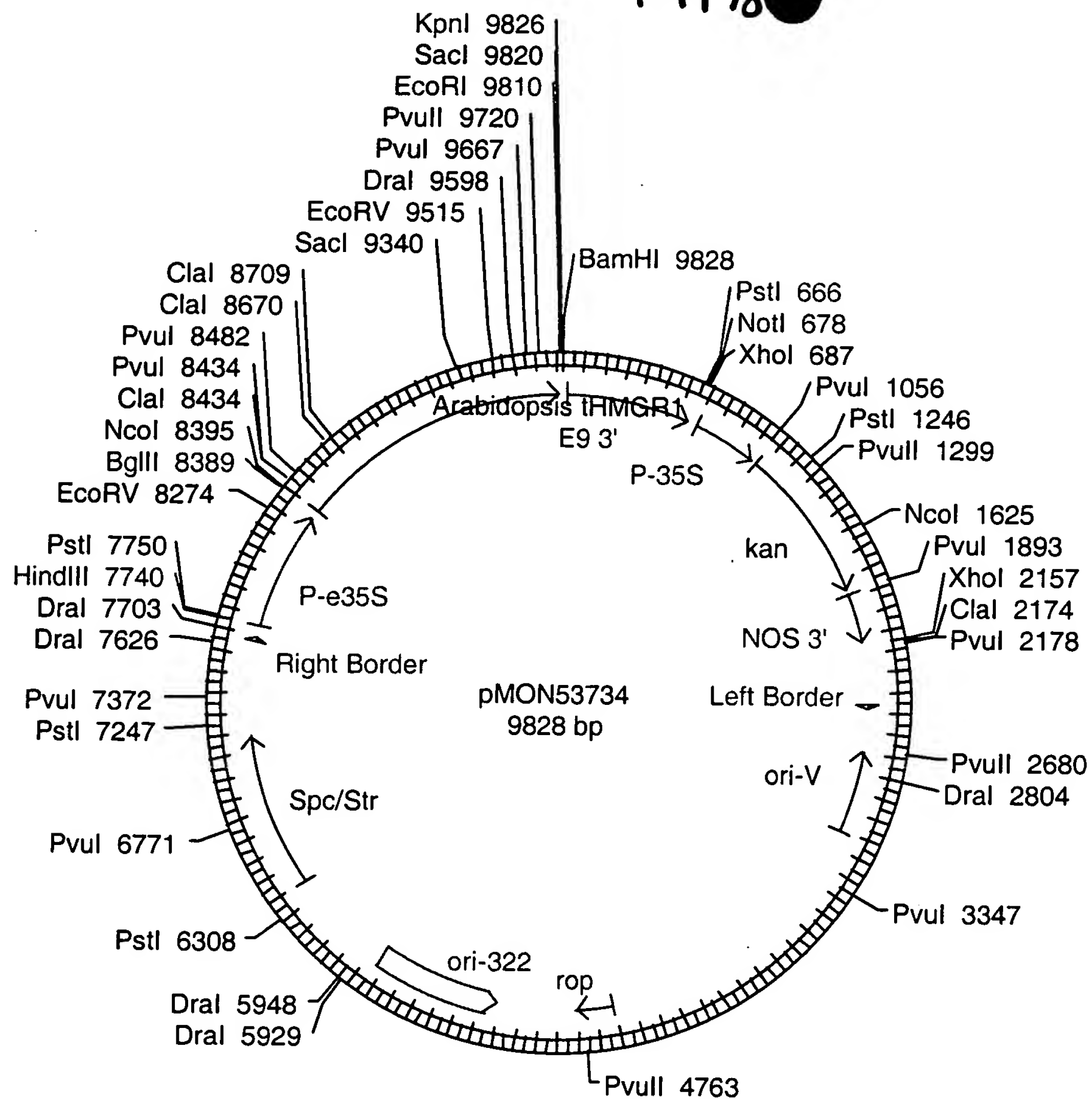


Figure 14: Construct pMON53734

14/78



**D E F I N I T I O N**



Figure 16: Construct pMON53736



17/78

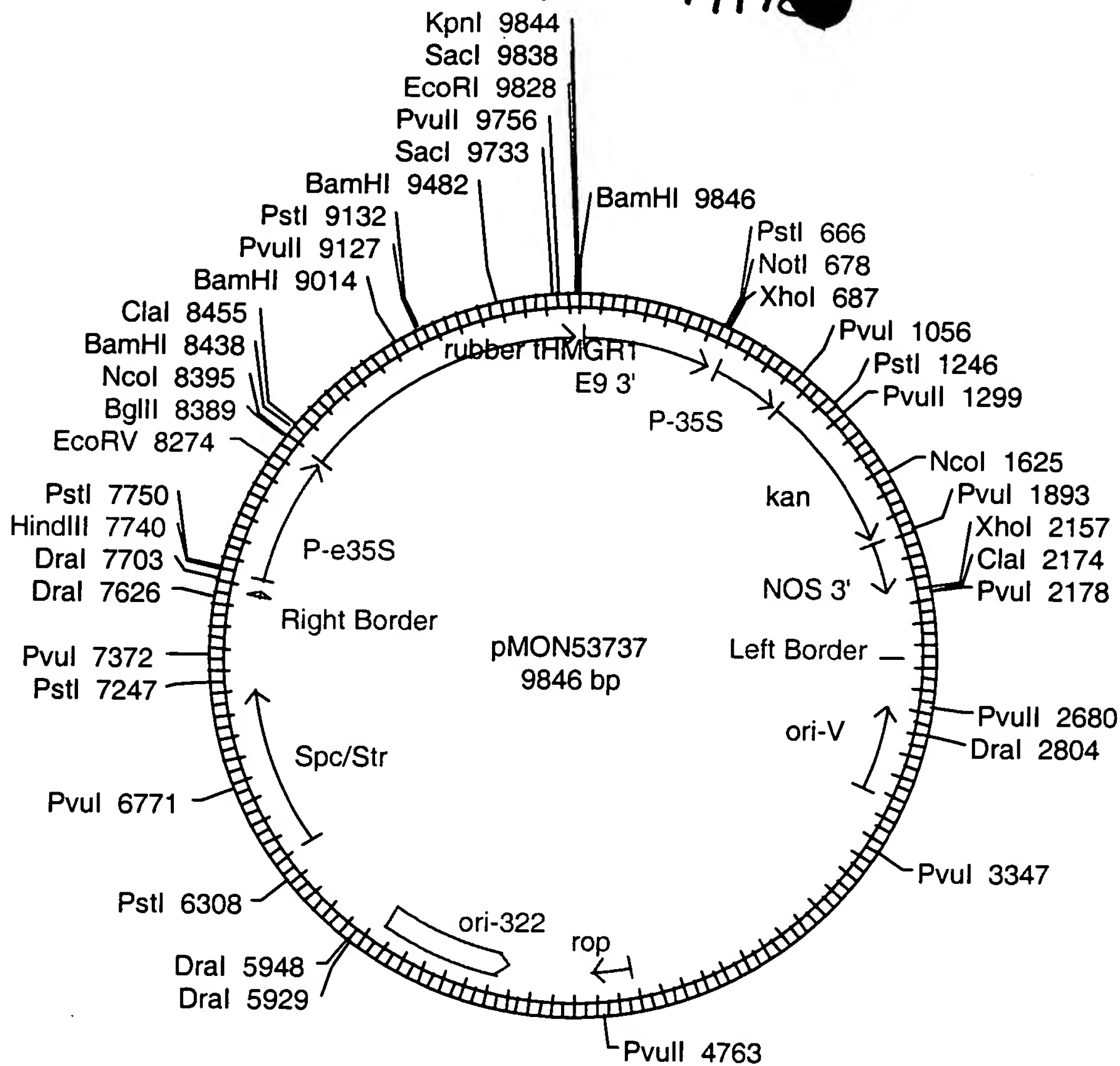


Figure 17: Construct pMON53737

1817

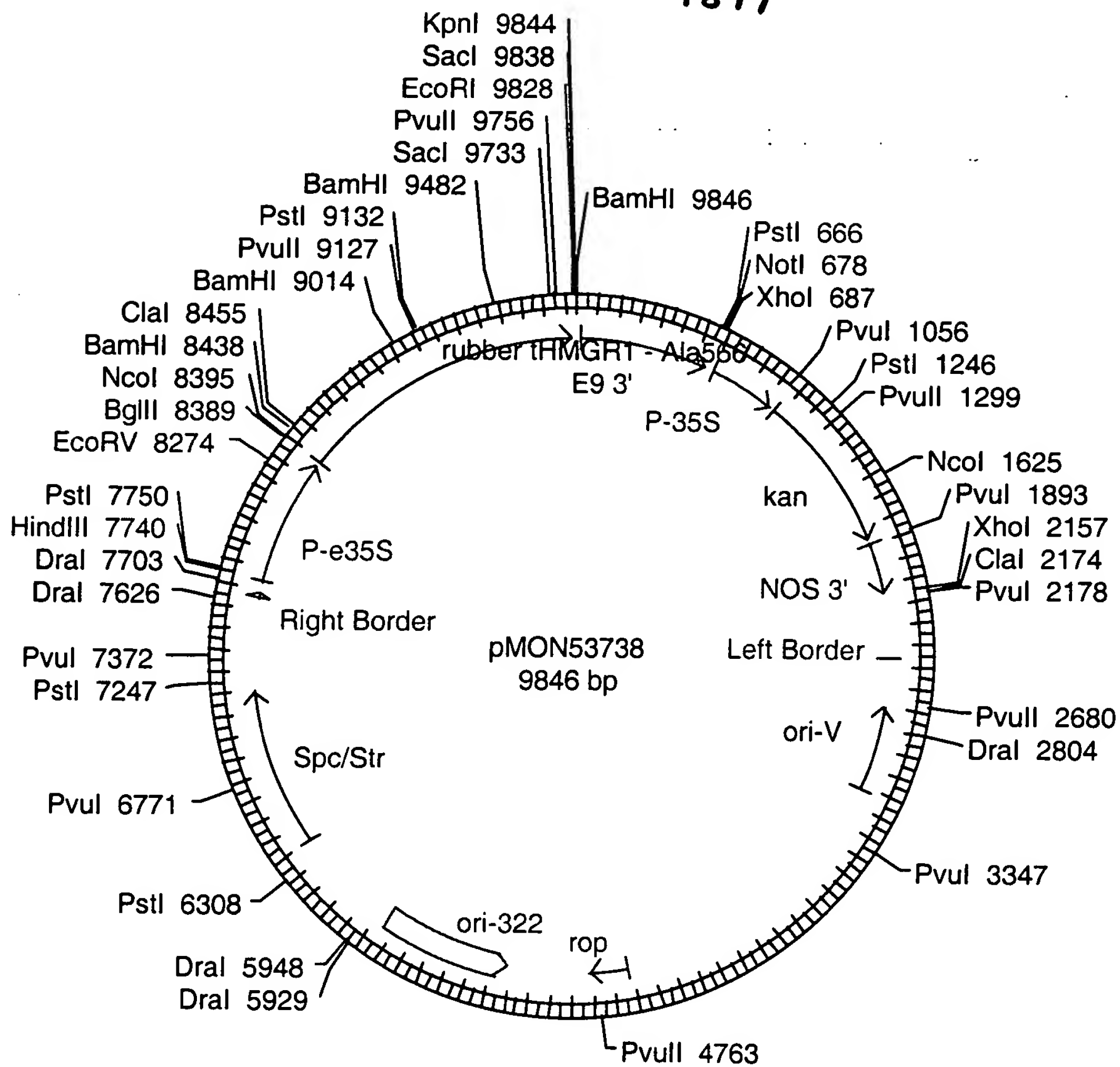


Figure 18: Construct pMON53738

100230" 22458850

**000000000000**

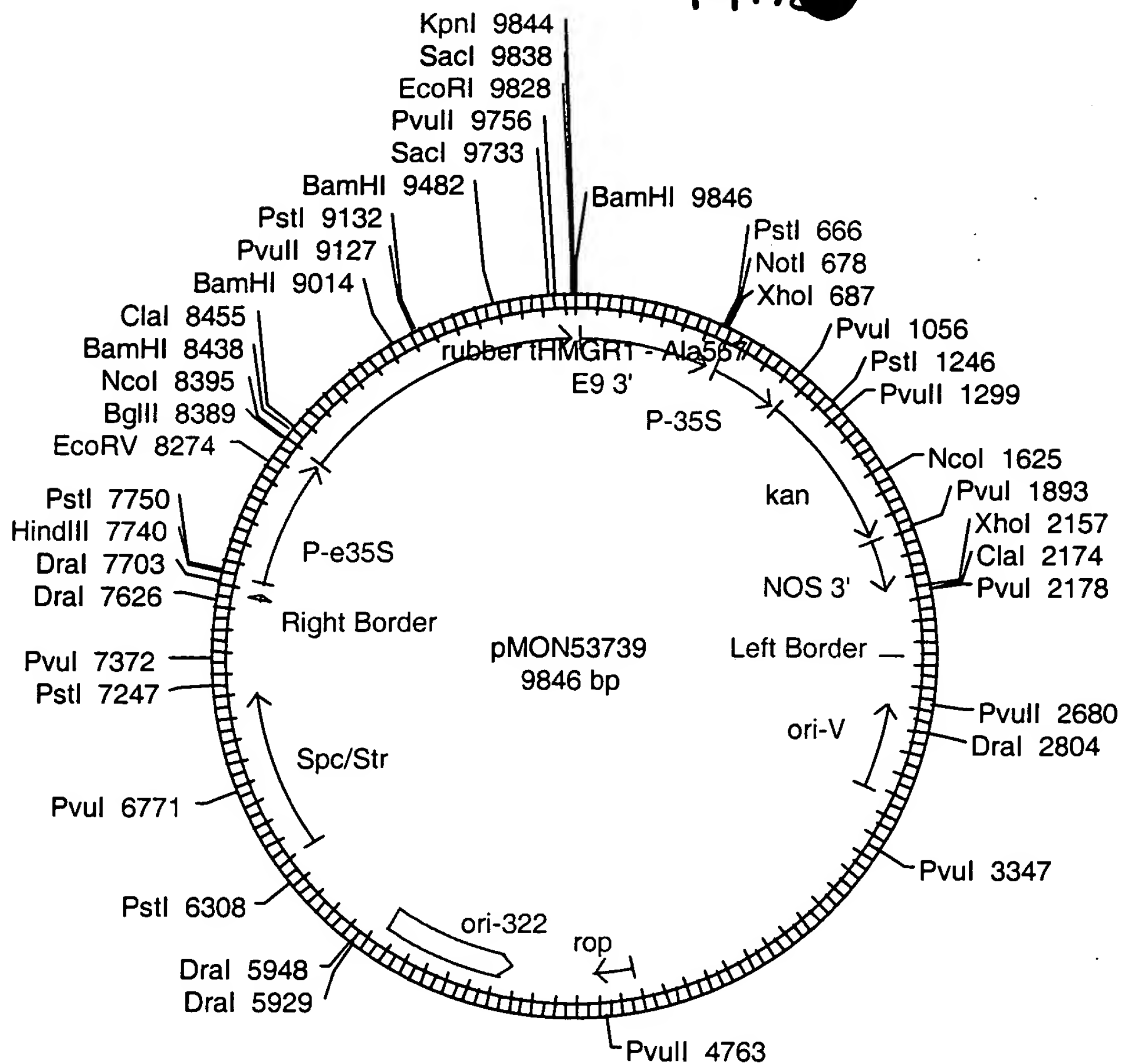


Figure 19: Construct pMON53739

20/78

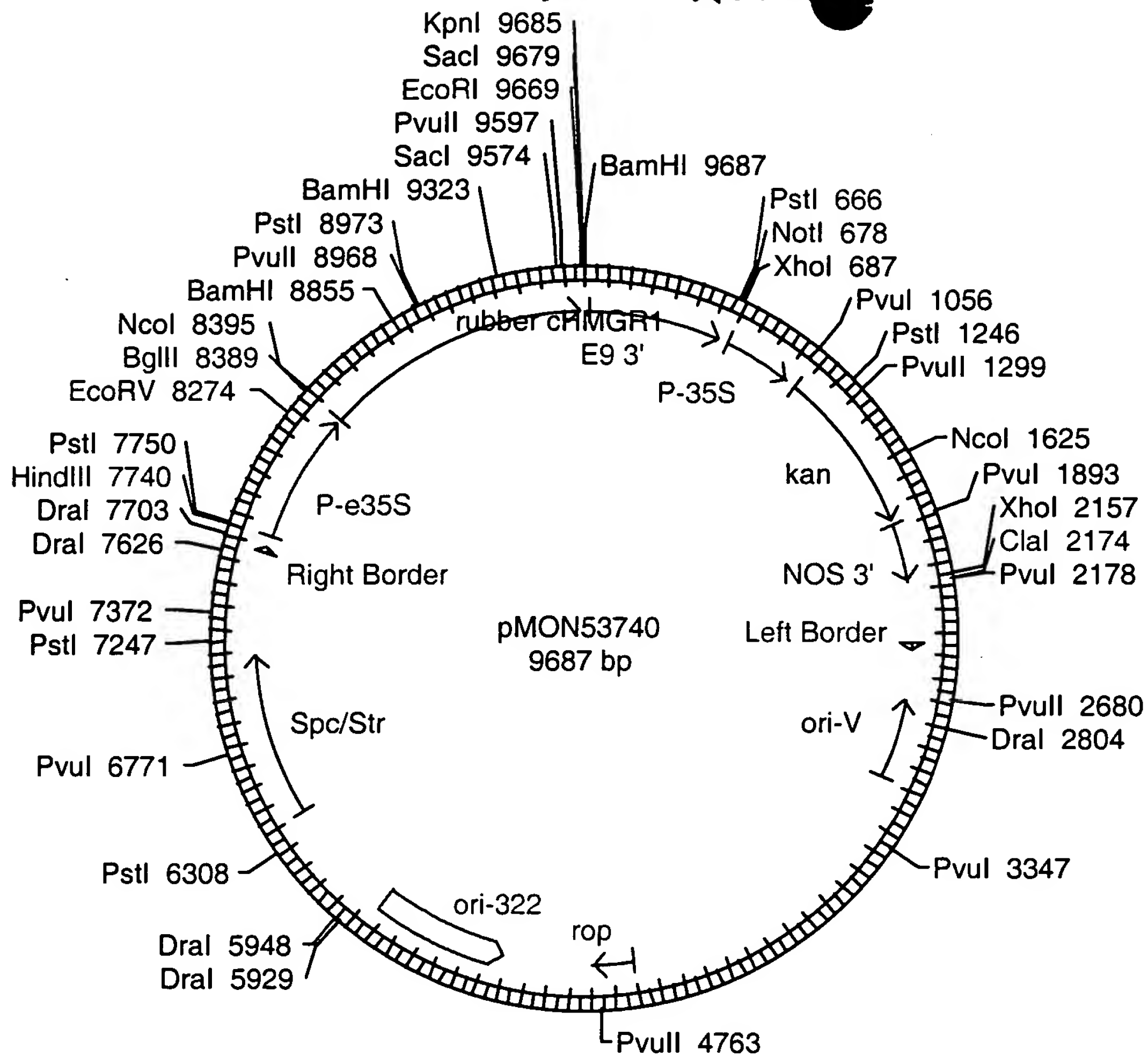


Figure 20: Construct pMON53740

098823-062001

# Comparison of Cycloartenol Levels in Transgenic Plants

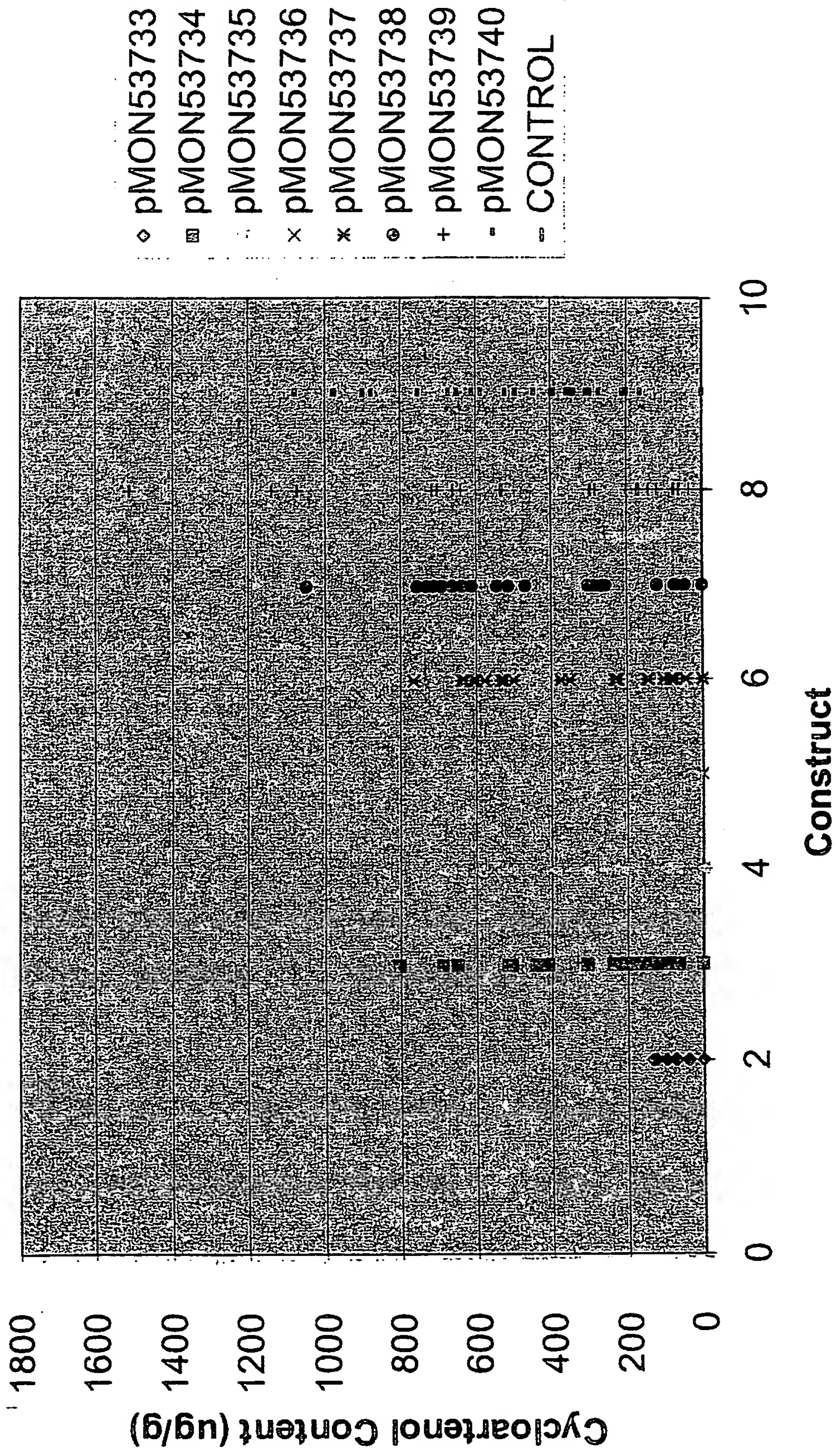
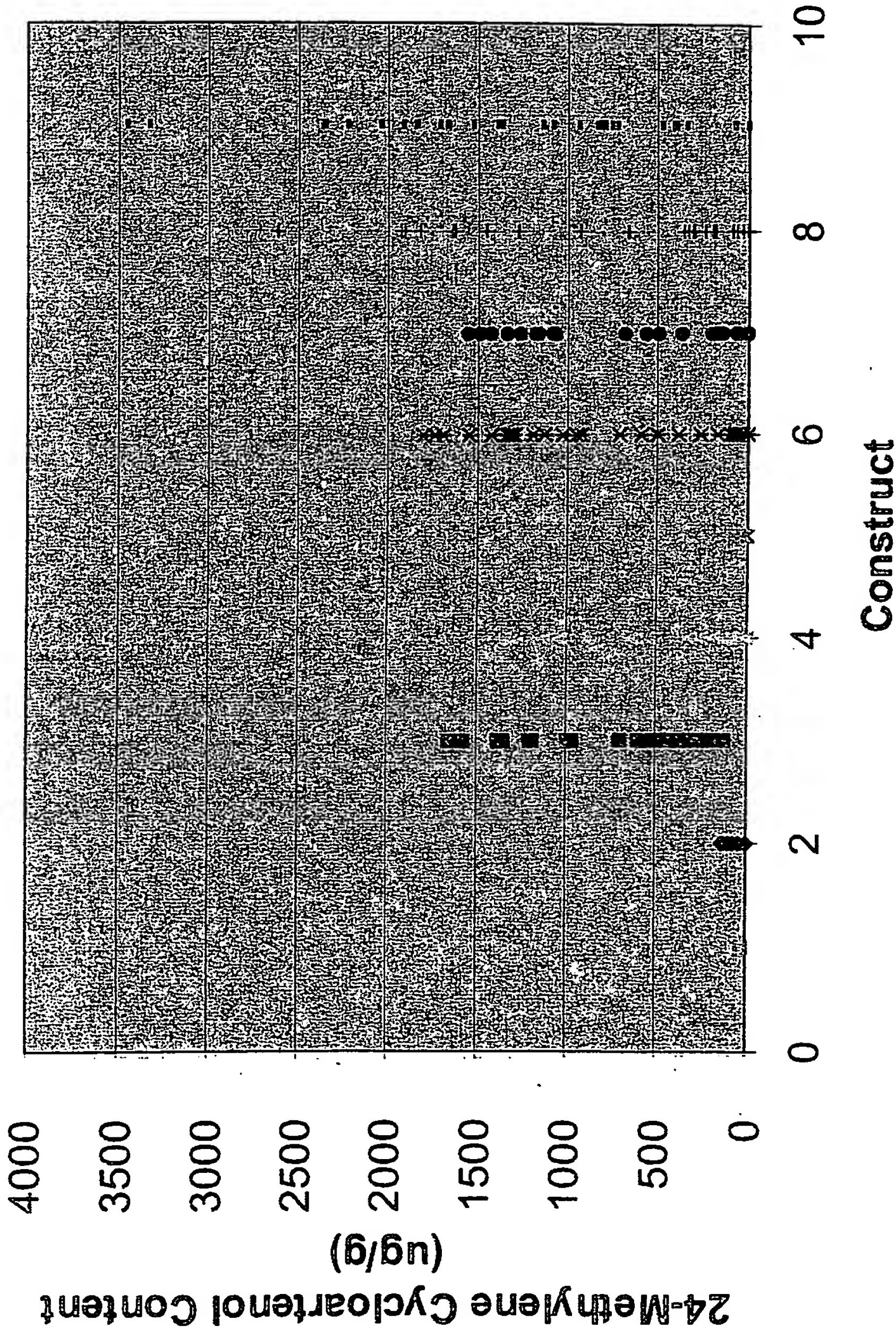


FIGURE 21



# Comparison of 24-Methylene Cycloartenol in Transgenic Plants



- ◇ pMON53733
- pMON53734
- pMON53735
- × pMON53736
- \* pMON53737
- pMON53738
- + pMON53739
- pMON53740
- CONTROL

FIGURE 22



100290" 6245860

# Comparison of Obtusifolios Levels in Transgenic Plants

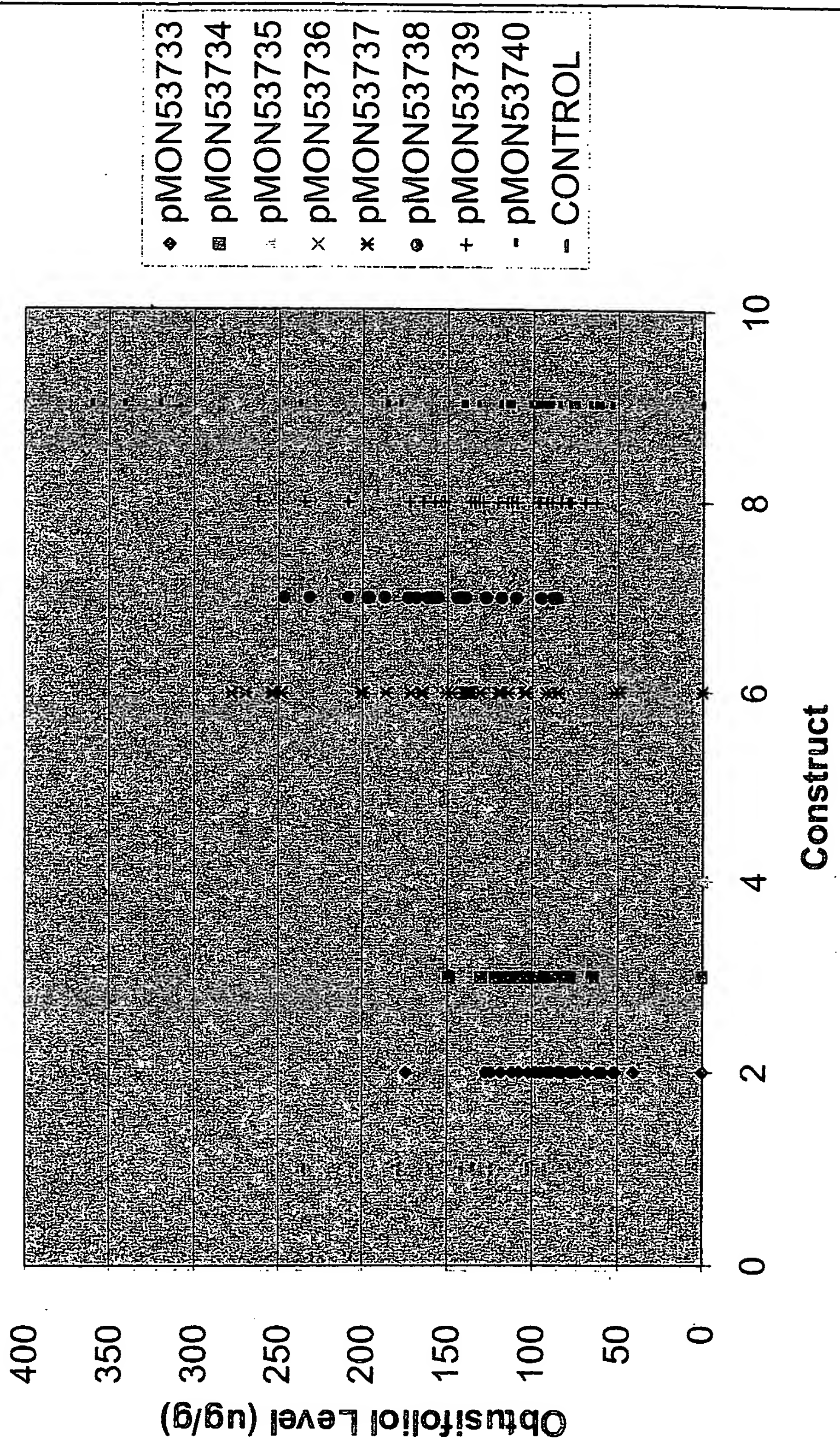


FIGURE 23



24/78

# Comparison of Campesterol Levels in Transgenic Plants

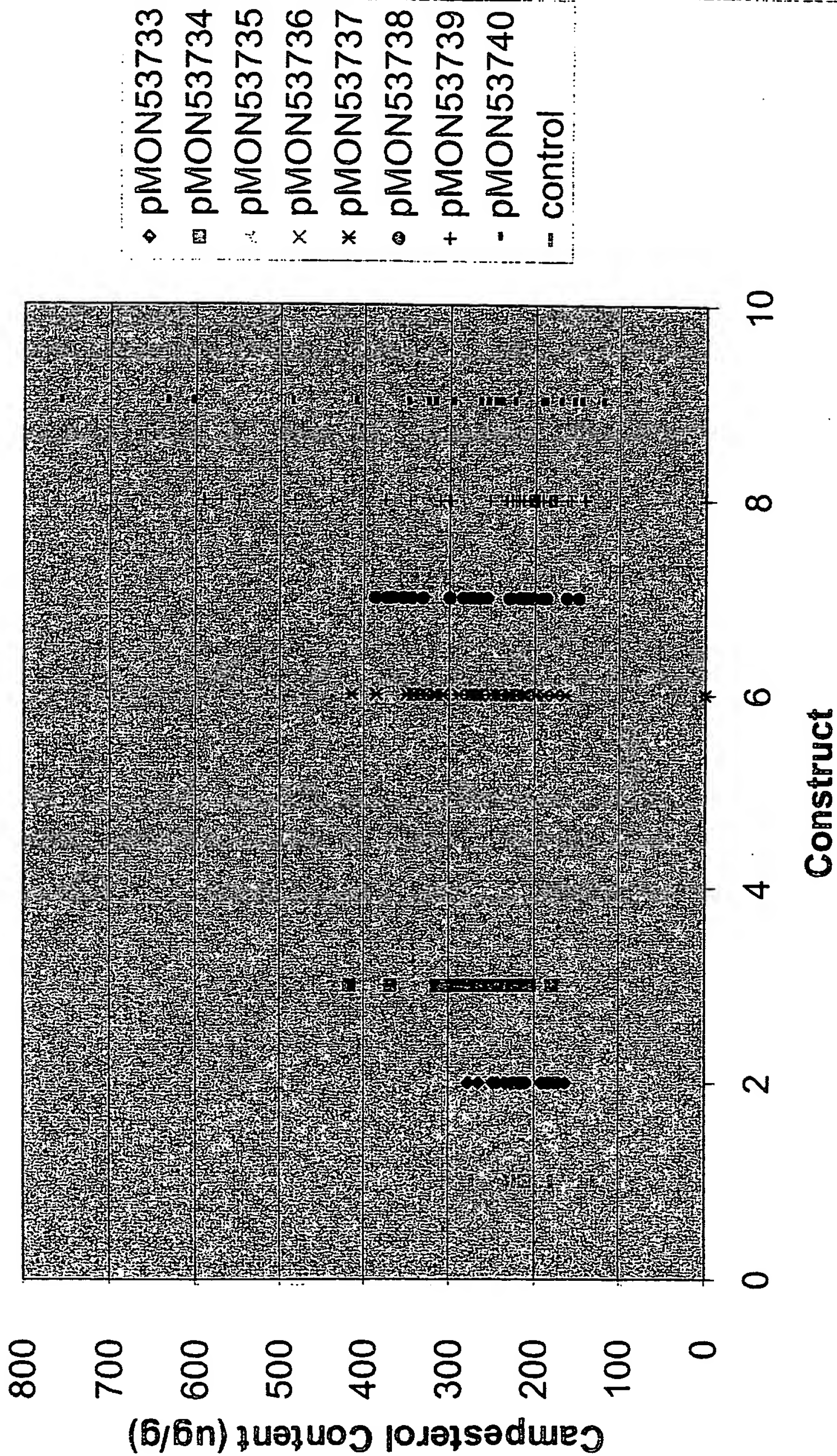
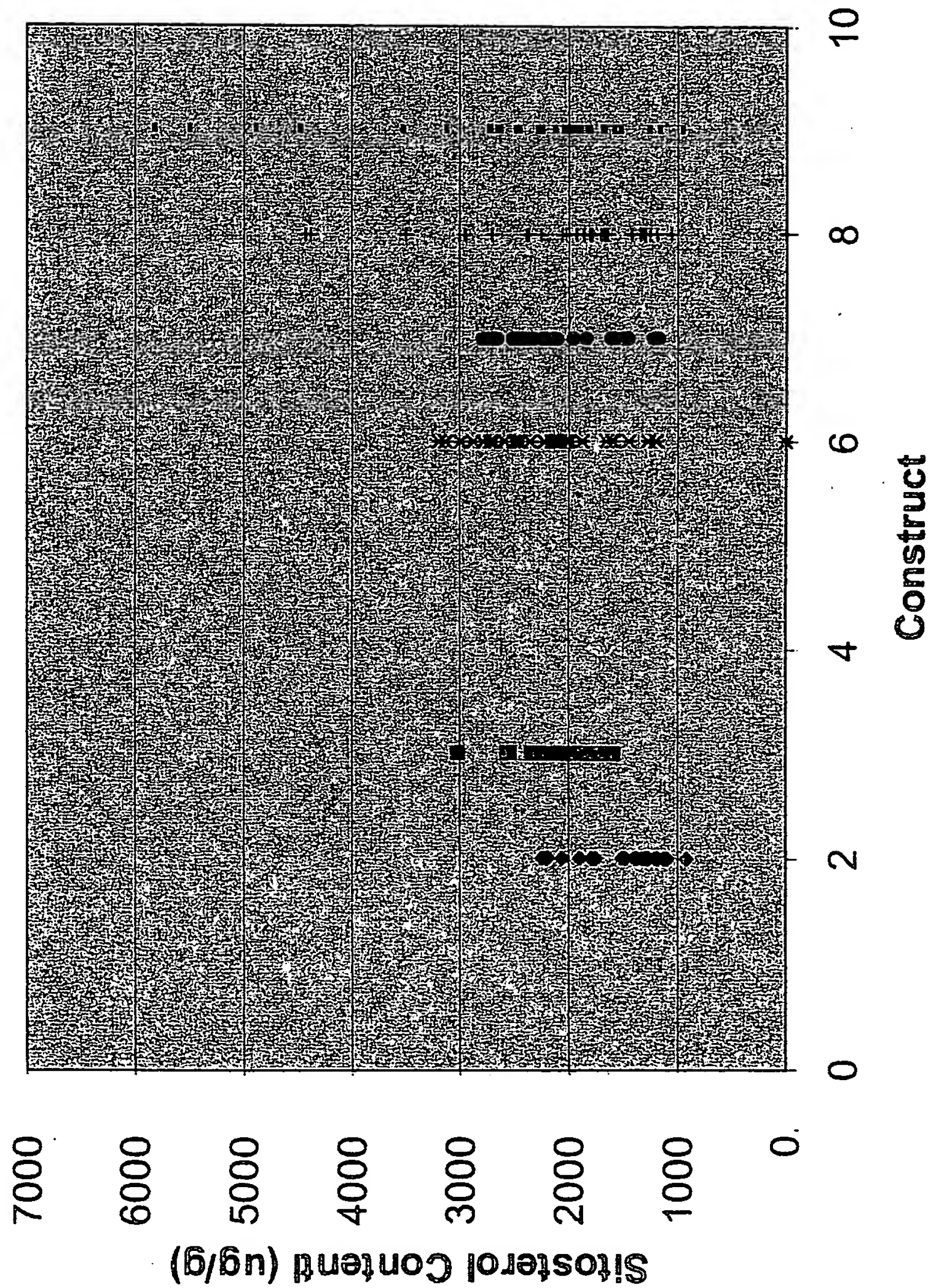


FIGURE 24



# Comparison of Sitosterol Levels in Transgenic Plants





# Comparison of Sitostanol Levels in Transgenic Plants

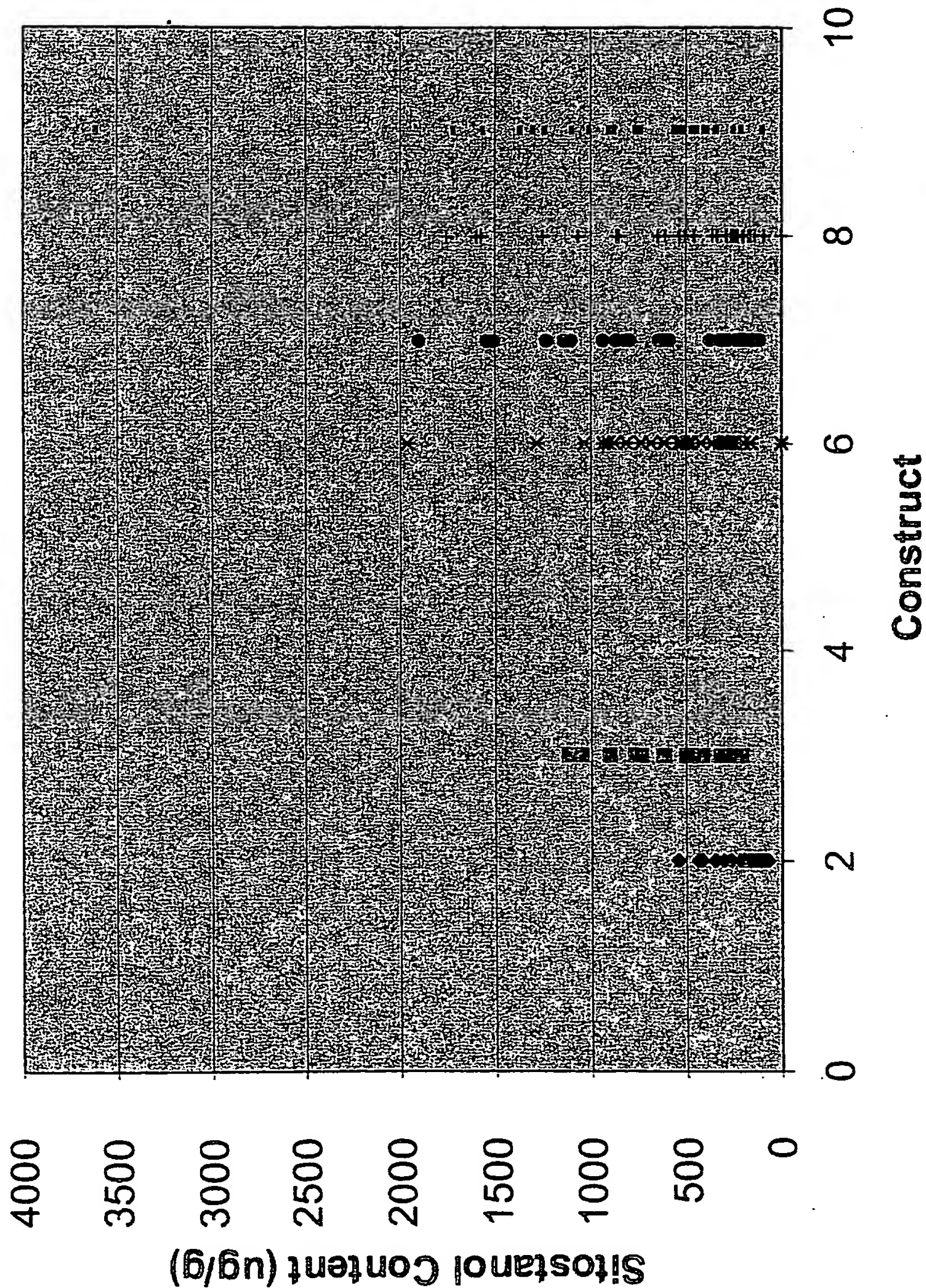


FIGURE 26

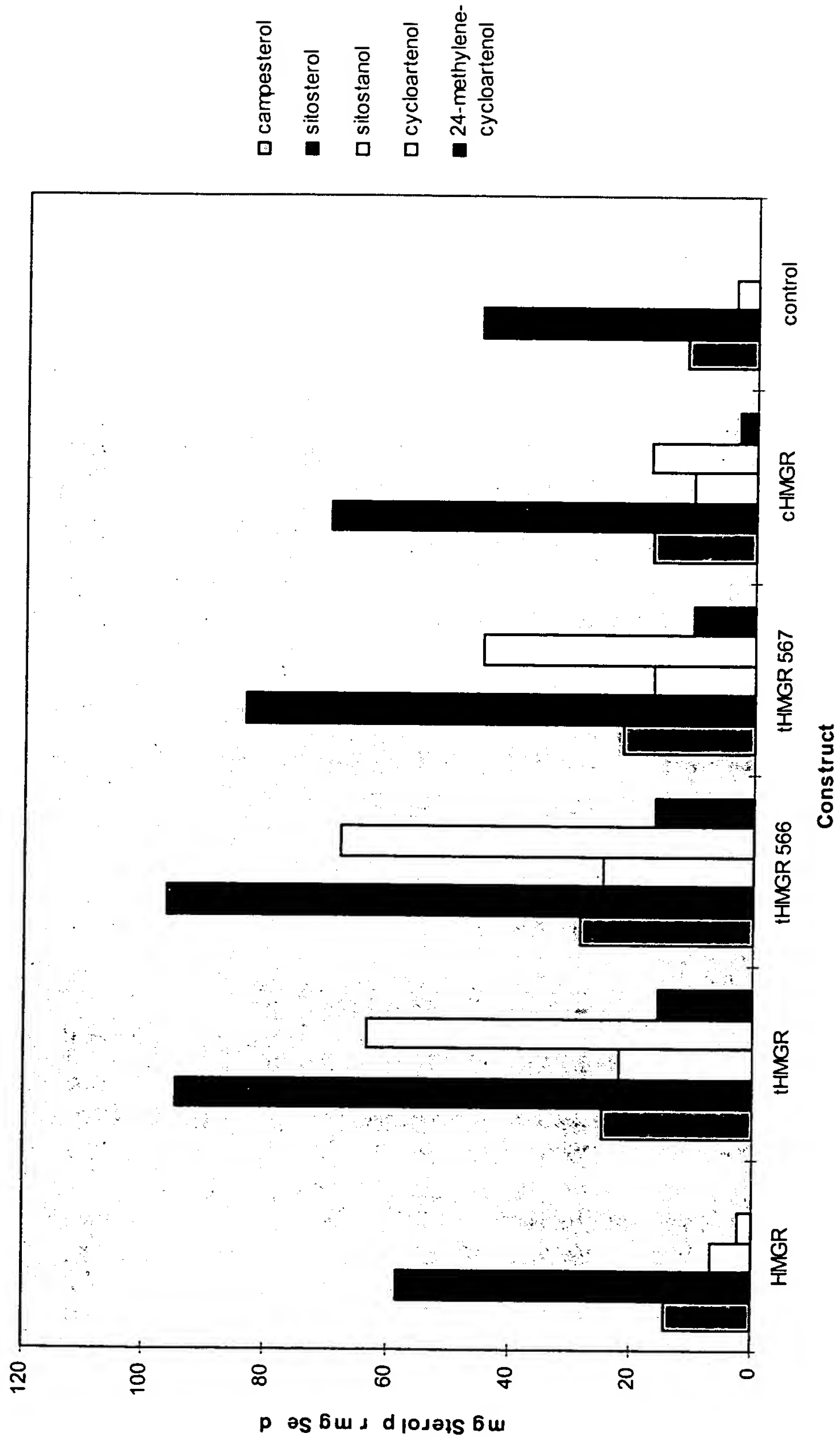


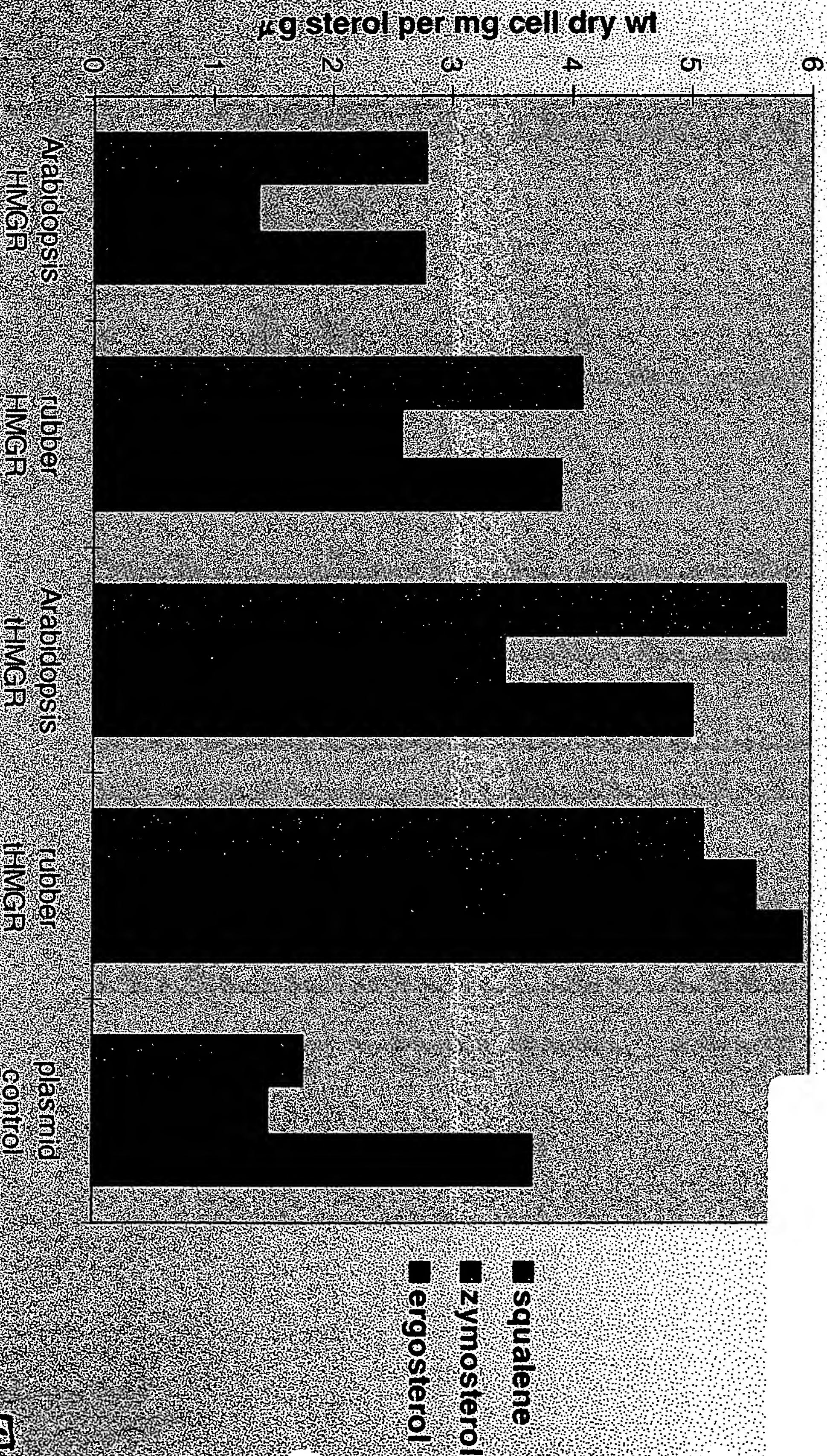
Figure 27: Sterol profile of transgenic *Arabidopsis* harboring different forms of rubber HMGR. HMGR: rubber full length HMGR; tHMGR: catalytic domain of rubber HMGR with the linker region; tHMGR 566: catalytic domain with linker region of rubber HMGR in which the serine residue at 566 is converted to alanine; tHMGR 567: catalytic domain with linker region of rubber HMGR in which the serine residue at 567 is converted to alanine; cHMGR: catalytic domain of rubber HMGR without the linker region.



# Plant HMG R Constructs in Yeast HMG R1

## Knockout Mutant

FIGURE 28



GREG THORNE

STANOL PLANT BIOTECH

MONSANTO

Food Health Hope





29/78

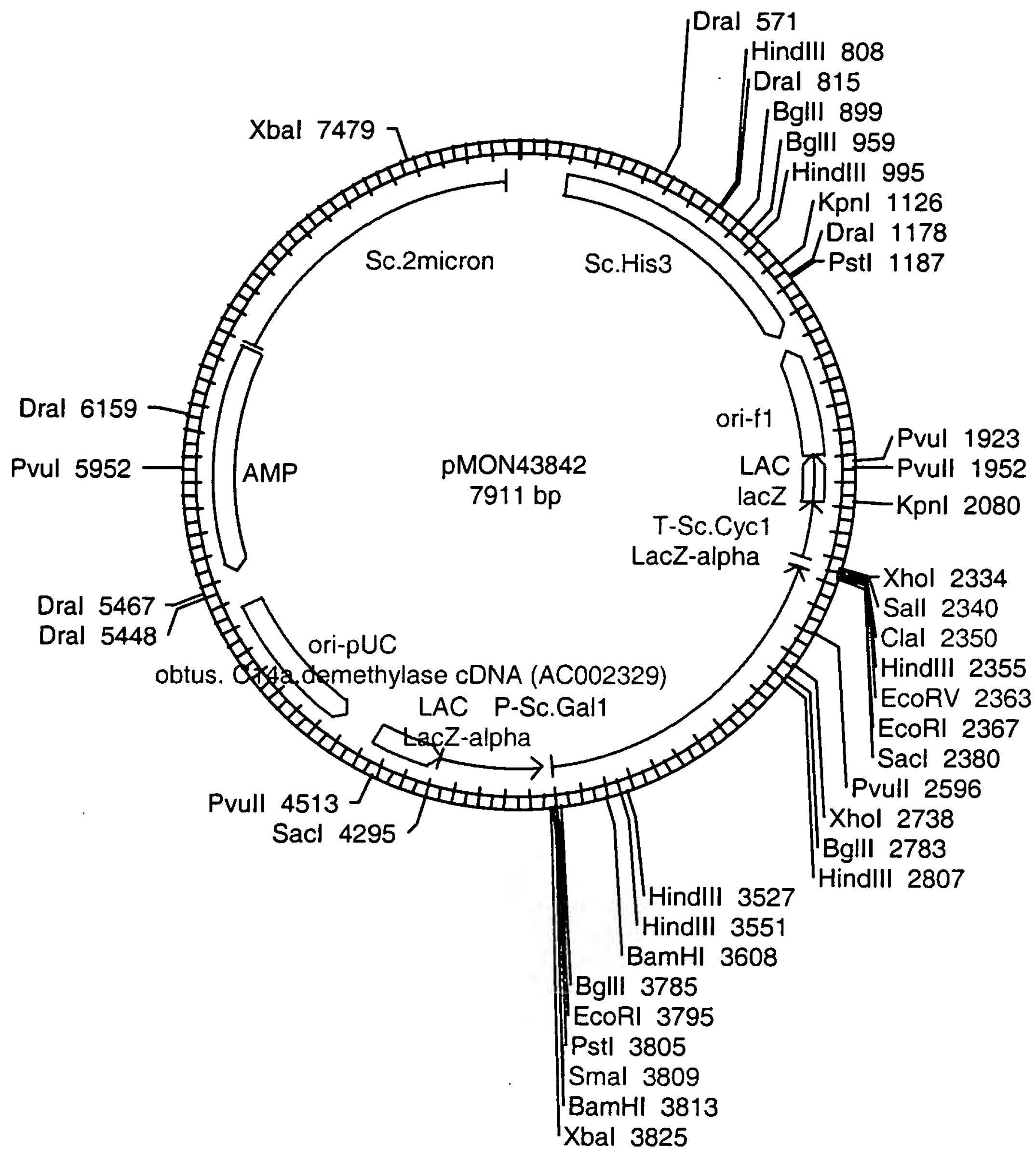


Figure 29: Construct pMON43842

0988573.06204  
T00290"E2258860

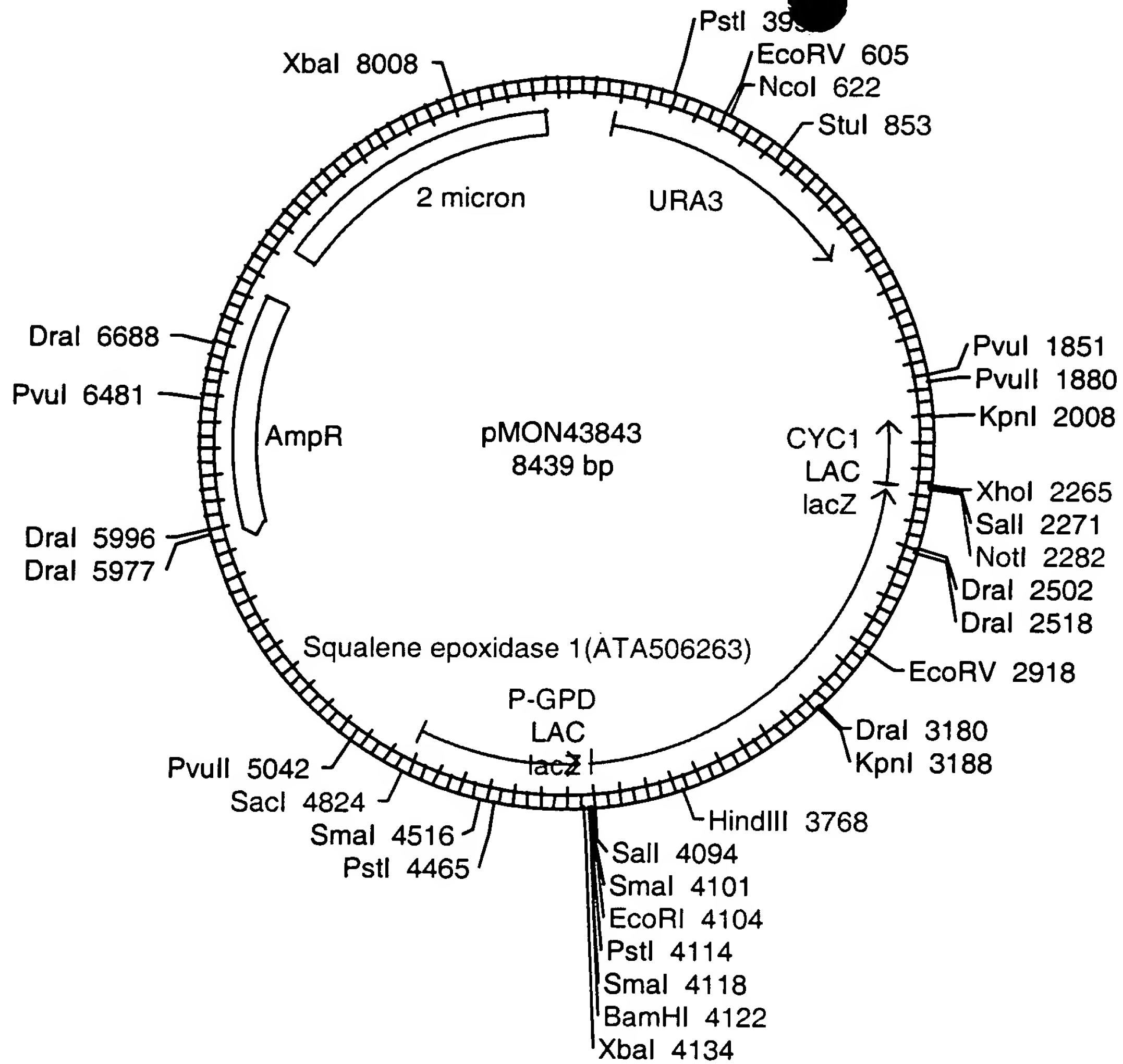


Figure 30: Construct pMON43843

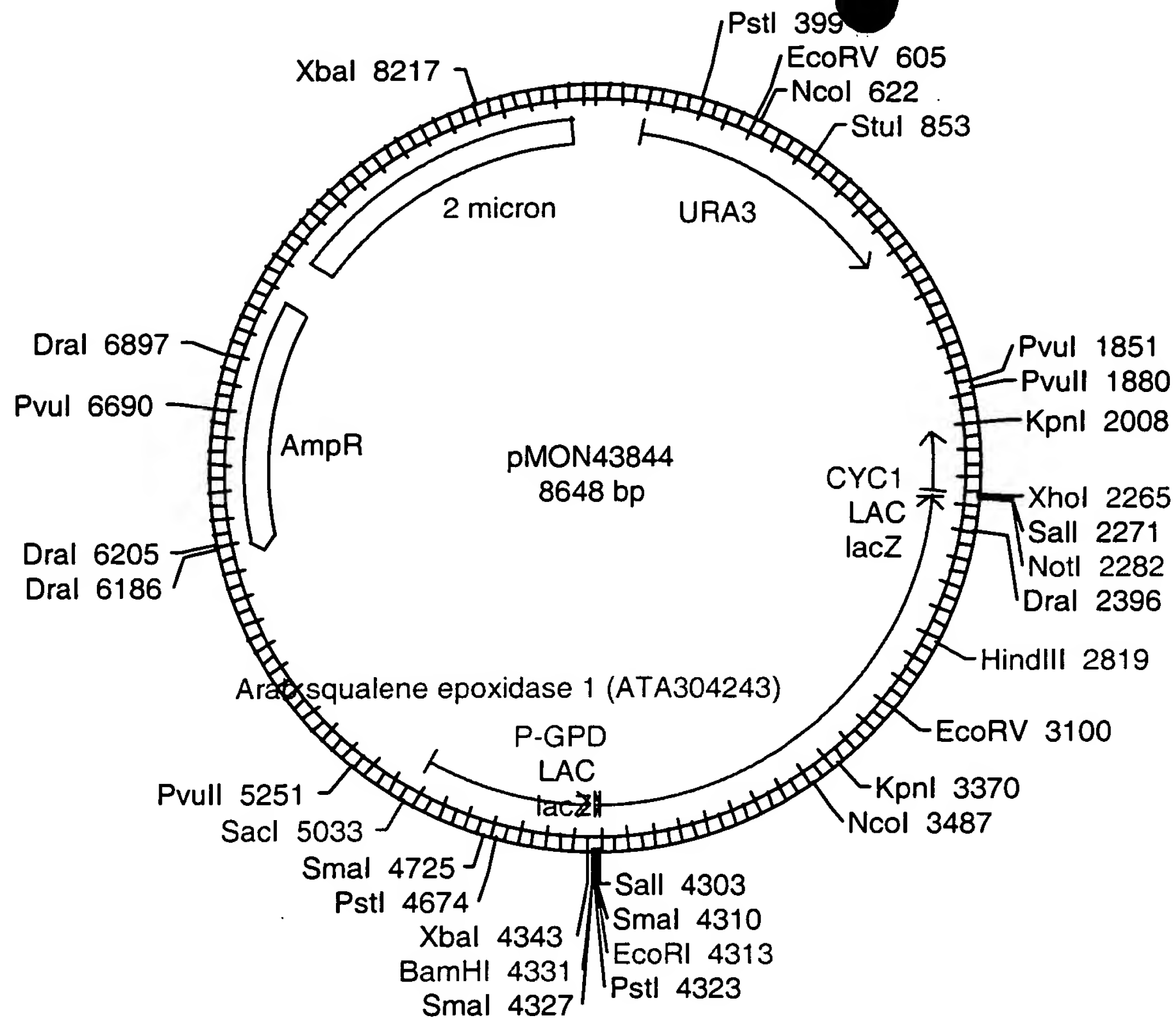


Figure 31: Construct pMON43844

1

[illegible]

1

1



```

HMGRclustalW{chineseha2} .....
.....
HMGRclustalW{syrianhamst} .....
.....
    HMGRclustalW{    rat} .....
.....
    HMGRclustalW{    rabbit} .....
.....
    HMGRclustalW{    human} .....
.....
    HMGRclustalW{    mouse} .....
.....
    HMGRclustalW{    xenopus} .....
.....
    HMGRclustalW{sea urchin} .....
.....
    HMGRclustalW{cockroach} .....
.....
    HMGRclustalW{drosophila} .....
.....
    HMGRclustalW{dictyostel} .....
.....
    HMGRclustalW{schistosom} .....
.....
    HMGRclustalW{archaeoglo} .....
.....
    HMGRclustalW{pseudomonas} .....
.....

                Consensus -----
-----

```

098573.06201  
T00290"0245860

FIG. 32B

100  
 HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} EWKLDN.QY STYLSIKPDE LFEKCTHYR SPVSDTWKLL  
 SSKEAADITYT  
 HMGRclustalW{ yeast1} GWQLDSNSVF ETAPNKDSNT LFQECSHYYR DSSLDGWVSI  
 TAHEASELPA  
 HMGRclustalW{phycomycs} .....  
 .....  
 HMGRclustalW{ fusarium} .....MDH EGCQGQHPQQ  
 CCQWVSNAWS  
 HMGRclustalW{ candida} .....MFYH GASANQHWIA  
 VDDLKVPVD  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} .....  
 .....  
 HMGRclustalW{ corn} .....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} .....  
 .....  
 HMGRclustalW{rosyperiw} .....  
 .....  
 HMGRclustalW{ tomato} .....  
 .....  
 HMGRclustalW{woodtobacc} .....  
 .....  
 HMGRclustalW{ potato} .....  
 .....  
 HMGRclustalW{radish} .....  
 .....  
 HMGRclustalW{arabadopsis1} .....  
 .....  
 HMGRclustalW{cucumismel} .....  
 .....  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertrel} .....  
 .....  
 HMGRclustalW{camptothec} .....  
 .....  
 HMGRclustalW{arabadops2} .....  
 .....  
 HMGRclustalW{chineseham} .....MLSRLFRMH  
 GLFVASHPWE  
 HMGRclustalW{chineseha2} .....MLSRLFRMH

4

FIG. 32D

150

5

```

HMGRclustalW{chineseha2} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{syrianhamst} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{      rat} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{      rabbit} VIVGTVT..L TICMMSMN.. MFTGNDK... ..
.....
HMGRclustalW{      human} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{      mouse} .....
.....
HMGRclustalW{      xenopus} VIVGTVT..L TICMMSMN.. MFTGNDK... ..
.....
HMGRclustalW{sea urchin} VIVCTLT..L TICMLSMN.. YFTGLPR... ..
.....
HMGRclustalW{cockroach} VIVATLT..L TVCMLTVDQ. RPLGLP.... ..
.....
HMGRclustalW{drosophila} VIVALLT..I TACMLNGGQE QYPGCEQRIG HSTASAAAAG
SGSGAGSGAS
HMGRclustalW{dictyoste1} .....
.....
HMGRclustalW{schistosom} .....
.....
HMGRclustalW{archaeoglo} .....
.....
HMGRclustalW{pseudomonas} .....
.....
Consensus VIVGTVT--L TICMMSMN-- MFTGNNK--- -----
-----

```

09885723.062001

200

7

```

HMGRclustalW{chineseha2} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
HMGRclustalW{syrianhamst} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
HMGRclustalW{      rat} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
HMGRclustalW{      rabbit} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
HMGRclustalW{      human} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
HMGRclustalW{      mouse} .....
.....
HMGRclustalW{      xenopus} .....I CGWNYAC.PK FEEDVLSSDI
IILTITRCIA
HMGRclustalW{sea urchin} .....I CGWNYECAPQ VKESSLSSDV
LVMCIMRTLA
HMGRclustalW{cockroach} ..... PGWGHNC..I TLEEYNAADM
IVMTLIRCVA
HMGRclustalW{drosophila} GTIPPSSMGG SATSSRHRPC HGWSQSC.DG LEAEYNAADV
ILMTIVRCTA
HMGRclustalW{dictyostel} .....
.....
HMGRclustalW{schistosom} .....M LKILNTVLLF FDCFSTGTFF
VLLIYLFTRL
HMGRclustalW{archaeoglo} .....
.....
HMGRclustalW{pseudomonas} .....
.....

Consensus -----I CGWNYEC-PK FEEDVLSSDI
IILTITRCIA

```

0905723-062001

FIG.32 H

201

250

HMGRclustalW{methanobac}	.....	
.....		
HMGRclustalW{methanococ}	.....	
.....		
HMGRclustalW{halobacter}	.....	
.....		
HMGRclustalW{sulfolobus}	.....	
.....		
HMGRclustalW{ yeast2}	FYTLCCLFND MRKIGSKFWL SFSALSNSAC ALYLSLYTTH	
SLLKKPASLL		
HMGRclustalW{ yeast1}	FYTIFGLFND MRKTGSNFWL SASTVVNSAS SLFLALYVTQ	
CILGKEVSAL		
HMGRclustalW{phycomyces}	.....	
.....		
HMGRclustalW{ fusarium}	HAIEHRR IQA QNSKSGKRSP DGSTQNMIQY AVQAAIKEKG	
FEIIRDYAIE		
HMGRclustalW{ candida}	FYTLENLFAR MRAVGSKVWL GLSTLVSSFF AFLFALYITT	
RVLDSLIPFL		
HMGRclustalW{dictyoste2}	.....	
.....		
HMGRclustalW{wheat1}	.....	
.....		
HMGRclustalW{ rice}	.....	
.....		
HMGRclustalW{ corn}	.....	
.....		
HMGRclustalW{wheat3}	.....	
.....		
HMGRclustalW{wheat2}	.....	
.....		
HMGRclustalW{ soybean}	.....	
.....		
HMGRclustalW{rubbertre3}	.....	
.....		
HMGRclustalW{rosyperiwi}	.....	
.....		
HMGRclustalW{ tomato}	.....	
.....		
HMGRclustalW{woodtobacc}	.....	
.....		
HMGRclustalW{ potato}	.....	
.....		
HMGRclustalW{radish}	.....	
.....		
HMGRclustalW{arabadopsis1}	.....	
.....		
HMGRclustalW{cucumismel}	.....	
.....		
HMGRclustalW{rubbertre2}	.....	
.....		
HMGRclustalW{rubbertrel}	.....	
.....		
HMGRclustalW{camptothec}	.....	
.....		
HMGRclustalW{arabadops2}	.....	
.....		
HMGRclustalW{chineseham}	ILYIYFQFQN LRQLGSKYIL GIAGLEFTIFS SFVFSTVVIH	
.....		

FIG. 32I



[illegible]

• • • •

10

300

11

HMGRclustalW{chinese2} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{syrianhamst} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ rat} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ rabbit} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ human} FLDKELTGLN EALPFFLLLI DLSRASTLAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} FLDKELTGLN EALPFFLLLI DLSKASALAK FALSSNSQDE  
 VRDNIARGMA  
 HMGRclustalW{sea urchin} LFGLELTGLN EALPFFLLLI DLTKASALTK FALSSTTQNE  
 VVDNIARGMA  
 HMGRclustalW{ cockroach} FLGSDVSDLK DALFFFLLLI DLSKATVLAQ FALSSRSQDE  
 VKHNIARGIA  
 HMGRclustalW{drosophila} FLGSDISELK DALFFLLLLVI DLSNSGRLRS GAMGSN.QAE  
 VTQNIARGLE  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} MLRNKRQLNT LFYTLILFTF ALCSLSSVLF VPYTSFAIFL  
 LSTSVFLLFS  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus FLDKELTGLN EALPFFLLL- DL-RASALAK FALSSNSQDE  
 VRENIARGMA

090523 105200

FIG. 32L

350

HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} QEGAYLIRDY LFYISSFIGC AIYARHLPGL VNFCILSTFM  
 LVFDLLLSAT  
 HMGRclustalW{ yeast1} EEGRLIQDH LLCIFAFIGC SMYAHQLKTL TNFCILSAFI  
 LIFELILTPT  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} VSSVMSICVW PLRMMASRRV AENVAKGDDE LNRVRGDAPL  
 FGRKSSSIPK  
 HMGRclustalW{ candida} EQGPLLLRDH LFMITAFLGC SFYASYLDGL KNFCILAALI  
 LAFDILTST  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} ..... .MRIT.....  
 ...NGLAMVS  
 HMGRclustalW{ corn} PE....PSRA .....AA RVQAGDALPL PIRHT.....  
 ...NLIFSAL  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} .....HH L.....PP LKPSDYSLPL SLYLA.....  
 ...NALVFSL  
 HMGRclustalW{rosyperiwi} .....NQ Q.....PS IPRSSDVLPL PLYLA.....  
 ...NGVFFTL  
 HMGRclustalW{ tomato} QQ....QEDK N.....TL LIDASDALPL PLYLTT....  
 ...NGLFFTM  
 HMGRclustalW{woodtobacc} QQ....QEOD N.....SL LI.ASDALPL PLYLT.....  
 ...NGLFFTM  
 HMGRclustalW{ potato} .....VS SPKASDALPL PLYLT.....  
 ...NGLFFTM  
 HMGRclustalW{radish} DD....DDRR K.....TLTS PPKASDALPL PLYLT.....  
 ...NAVFFTL  
 HMGRclustalW{arabadosis1} SD....DDHR RR..ATTIAP PPKASDALPL PLYLT.....  
 ...NAVFFTL  
 HMGRclustalW{cucumismel} SA....ADHL KR.....A SPKASDALPL PLYLT.....  
 ...NTIFFTL  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} PV....EDRS P.....T TPKASDALPL PLYLT.....  
 ...NAVFFTL  
 HMGRclustalW{camptothec} KV....DAVD L.....PD SPKASDALPL PLYIT.....  
 ...NGVFFTL  
 HMGRclustalW{arabados2} .....VAVD .....PP LRKASDALPL PLYLT.....  
 ...NTFFLSL  
 HMGRclustalW{chineseham} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFVFMT

HMGRclustalW{chineseha2} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFVFMT  
 HMGRclustalW{syrianhamst} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFVFMT  
 HMGRclustalW{ rat} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFVFMT  
 HMGRclustalW{ rabbit} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFVFMT  
 HMGRclustalW{ human} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFVFMT  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} ILGPTFTLEA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS  
 VLANYFAFMT  
 HMGRclustalW{sea urchin} ILGPTITLDT VV..TTLVIS IGTMSIRKM EVFCCFGILS  
 LIANYFVFMT  
 HMGRclustalW{ cockroach} MLGPTITLDT VV..ETLVIG VGMLSGVRRL EVLCCFACMS  
 VIVNYVVFMT  
 HMGRclustalW{drosophila} LLGPAISLDT IV..VLLVG VGTLSGVQRL EVLCMFAVLS  
 VLVNYVVFMT  
 HMGRclustalW{dictyostel} .....M LFAPPNLETK ELFWIIY.IL  
 ILIPKVFAKV  
 HMGRclustalW{schistosom} DLSVFFIVLE YYLLEIELVN YEHA KRHCLL SHLFSNQLFV  
 DHMLGMFLKT  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus ILGPTFTLDA LV--ECLVIG VGTASD-LPL -LYCTFGCMS  
 VLANYFFFMT

FIG. 32N

[illegible]

400

15

FIG. 320

HMGRclustalW{chineseha2}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{syrianhamst}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{rat}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{rabbit}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{human}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{mouse}	.....
.....	
HMGRclustalW{xenopus}	FFPACVSLVL ELSRESREGR PIWQ...LSQ FASVLEEEED
NKPNPVTQRV	
HMGRclustalW{sea urchin}	FFPACLSLVL ELSNSNKYGR PVWH...LGR FAEVLEEEED
RKPNPVVQRV	
HMGRclustalW{cockroach}	FYPACLSLIL ELSRSGESGR PAWHD..KSL IIKALHEED.
QKPNPVVQRV	
HMGRclustalW{drosophila}	FYPACLSLIF DLSRSGVDMS VVREKAKGSL PLKSLTEEE.
QKANPVLQRV	
HMGRclustalW{dictyostel}	MSVRELFPPF KWGFNIRRSN FLVP..... ILSNNVI
VTGEEAVQYE	
HMGRclustalW{schistosom}	SLFSISTTSK YAYLESIFKC TLMEQIIYIM IVFVFLPSFM
RIFASYAKRM	
HMGRclustalW{archaeoglo}	.....
.....	
HMGRclustalW{pseudomonas}	.....
.....	
Consensus	FFSACYSLLL -WRRKIRNST PLHV---LSH FARVTLEEEA AKPN-

VASRI

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	401	
450		
HMGRclustalW{methanobac}	.....	
.....		
HMGRclustalW{methanococ}	.....	
.....		
HMGRclustalW{halobacter}	.....	
.....		
HMGRclustalW{sulfolobus}	.....	
.....		
HMGRclustalW{ yeast2}	FLRSNVAIL GKASVIGLLL LINLYVF... .TDKLNATIL	
NTVYFDSTIY		
HMGRclustalW{ yeast1}	FLNLSVVVII MKLSVILLFV FINFYNF... GANWVN.DAF	
NSLYFDKERV		
HMGRclustalW{phycomycs}	.....	
.....		
HMGRclustalW{ fusarium}	PFKVASNGLD AILPTAKSNN RPTLVTV... LTPIKYELEY	
PSIHYALGSA		
HMGRclustalW{ candida}	TFTDAPSTLV TVAKVAGVSV FFGLHFY... GFGSAWLSDL	
SAGNETNDTF		
HMGRclustalW{dictyoste2}	.....	
.....		
HMGRclustalW{wheat1}	.....	
.....		
HMGRclustalW{ rice}	YLLSLFAHPD APATTGDDD .....	
.....		
HMGRclustalW{ corn}	YLLSFFGIAF VQSIVSSGDD .....	
.....		
HMGRclustalW{wheat3}	.....	
.....		
HMGRclustalW{wheat2}	.....	
.....		
HMGRclustalW{ soybean}	.....	
.....		
HMGRclustalW{rubbertre3}	YLLGFFGIGF VHSFS.RAST .....	
.....		
HMGRclustalW{rosyperiwi}	YLVSFFGLDF VQSLIYKPNN .....	
.....		
HMGRclustalW{ tomato}	YLLGFFGIGF VQTFVSRGNN .....	
.....		
HMGRclustalW{woodtobacc}	YLLGFFGIGF VQSFVSRDNN .....	
.....		
HMGRclustalW{ potato}	YLLGFFGIGF VQSFVSRSNS .....	
.....		
HMGRclustalW{radish}	YLLGFFGIDF VQSFISRP.. .....	
.....		
HMGRclustalW{arabadopsis1}	YLLGFFGIDF VQSFISRASG .....	
.....		
HMGRclustalW{cucumismel}	YLLGFFGIDF VQSFARSSP .....	
.....		
HMGRclustalW{rubbertre2}	.....	
.....		
HMGRclustalW{rubbertrel}	YLLGFFGIDF VQSFARASH .....	
.....		
HMGRclustalW{camptothec}	YLLGFFGIGL VQPFTSRSSH .....	
.....		
HMGRclustalW{arabadops2}	YLLGFCGIDL IFRSS..SD. ....	
.....		
HMGRclustalW{chineseham}	KMIMSLGLVL VHAHSRWIAD PSPQNST... TE.HSKVSLG	
LDEDVSKRIE		

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[illegible]

VSKRIE

18

451

500  
 HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} SLPNFINYKD IGNLSNQVII SVLPKQYYTP LKKYHQIEDS  
 VLLIIDSVS  
 HMGRclustalW{ yeast1} SLPDFITSNA SENFKEQAIV SVTPLLYYKP IKSQRIEDM  
 VLLLLLRNVSV  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} ASNPAYN.DA FHHHFQGYGV GGRMVGGILK SLEDPVLSKW  
 IVIALALSVA  
 HMGRclustalW{ candida} TLYDAVA.DQ IPIGSNGTLV TLFPTRFPLP EKLSTQIEAV  
 VLSFIGLIST  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} ..D.....  
 .....  
 HMGRclustalW{ corn} ..DEDFLVGS G.....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} ..D.SWDVEE Y.....D DDNIIIKEDT  
 R.....  
 HMGRclustalW{rosyperiwi} ..E.GWEIEE .....EILMVEDS  
 RN.....  
 HMGRclustalW{ tomato} ..D.SWDE.. .....N DEEFLLKEDS  
 RC.....  
 HMGRclustalW{woodtobacc} ..DECWDEED E.....N DEQFLLEEDS  
 RR.....  
 HMGRclustalW{ potato} ..D.SWDIED E.....N AEQLIIEEDS  
 RR.....  
 HMGRclustalW{radish} ..D.SGDSER .....DFDDH  
 R.....  
 HMGRclustalW{arabadopsis1} ..D.AWDLAD T.....I .....DDDDH  
 R.....  
 HMGRclustalW{cucumismel} ..D.AWDLED .....EIDRT  
 L.....  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} ..D.VWDLED T.....D P.NYLIDEDH  
 R.....  
 HMGRclustalW{camptothec} ..DDVWGVDD DE.....D VDEIVLKEDT  
 R.....  
 HMGRclustalW{arabadops2} ..DDVWVNDG .....  
 .....  
 HMGRclustalW{chineseham} PSVSLWQFYL SKMISMDIEQ VVTLSLAFLL AVKYIFFEQA  
 ET..ESTLSL

T00230" E2458660

**SECRET**

20

FIG. 32T

501

550

HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} AIRDQFISKL LFFAFAVSIS INVYLLNAAK IHTGYMNFQ.  
 ..PQSNKIDD  
 HMGRclustalW{ yeast1} AIRDRFVSKL VLSALVCSAV INVYLLNAAR IHTSYTADQL  
 VKTEVTKKSF  
 HMGRclustalW{phycomycs} .....  
 .....  
 HMGRclustalW{ fusarium} LNGYLFNVAR WGIKDPNVPE HNIDRNELAR AREFNDTGS.  
 .....AT  
 HMGRclustalW{ candida} AARDKYISKF ILFAFAVSAS INVYLLNVAR IHTTRLEDA.  
 .....IE  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} .....  
 .....  
 HMGRclustalW{ corn} .....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} .....  
 .....  
 HMGRclustalW{rosyperiw} .....G.....  
 .....  
 HMGRclustalW{ tomato} .....G.....  
 .....  
 HMGRclustalW{woodtobacc} .....G.....  
 .....  
 HMGRclustalW{ potato} .....G.....  
 .....  
 HMGRclustalW{radish} .....  
 .....  
 HMGRclustalW{arabadopsis1} .....  
 .....  
 HMGRclustalW{cucumismel} .....  
 .....  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertrel} .....  
 .....  
 HMGRclustalW{camptothec} .....  
 .....  
 HMGRclustalW{arabadops2} .....  
 .....  
 HMGRclustalW{chineseham} KN..PITSPV VTPKKAPDNC CRREPLLVR SEKLSSVEEE  
 PGVSQDRKVE

HMGRclustalW{chineseha2} KN..PITSPV VTPKKAPDNC CRREPLLVRN SEKLSSVEEE  
 PGVSQDRKVE  
 HMGRclustalW{syrianhamst} KN..PITSPV ATPKKAPDNC CRREPVLNRR NEKLSSVEEE  
 PGVNQDRKVE  
 HMGRclustalW{ rat} KN..PITSPV VTPKKAQDNC CRREPLLVRN NQKLSSVEED  
 PGVNQDRKVE  
 HMGRclustalW{ rabbit} KN..PITSPV VTQKKVPDNC CRREPVVVRN NQKFCSVEEE  
 AGMSQDRKVE  
 HMGRclustalW{ human} KN..PITSPV VTQKKVPDNC CRREPMLVRN NQKCDSVEEE  
 TGINRERKVE  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} KN..PIISPV AVQKKQIESC CRREPEQ.EK TVHVSSTEEA  
 S..SKEETEA  
 HMGRclustalW{sea urchin} MEGHEVVNPG SDHEDASEVE TIGTLSSSPS TSDVRVIESM  
 TSRTQACQTD  
 HMGRclustalW{ cockroach} VTGDSVVNSN STDDAQLHYY IMRWLTV..S ADHIVILILL  
 LALAVKFVFF  
 HMGRclustalW{drosophila} RQ....SGPV AIEAKASQTT PIDEEHVE.. .....QEKD  
 TENSAAVRTL  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} YEVTSIFHFI YNIFHVINAN LVVYLFLGLF LFKRIRLNKP  
 INSQLRNLNI  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus KN--PITSPV VT-KKAPDNC CRREPLLVRN --K-SSVEEE -G-  
 SQDRKVE

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551

600  
 HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} LVVQKKSATI EFSET..... RSMMPA SSGLETPVTA  
 KDIIISEEIQ  
 HMGRclustalW{ yeast1} TAPVQKASTP VLTN..... KTVIS GSKVKSLSSA  
 QSSSSGPSSS  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} LPLGEYVPPT PMRTQ..... PSTPA ITDDEAEG..  
 ..LHMTKARP  
 HMGRclustalW{ candida} LKKPKKKASK TAVSV..... PKAVV VKDSETTKSS  
 EILHSSSESE  
 HMGRclustalW{dictyoste2} ..KGKSVNVE DLKDQ..... EIIAL VDKGEIQP..  
 ...HNLETRL  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} .....GQG GSR..... RA.....A  
 PPEPAPMHGH  
 HMGRclustalW{ corn} .....SSGS AAA..... PSRQHAQA  
 PAPCELLGSP  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} .....PTG AC..... AAPSLDCS  
 LSLPTKIHAP  
 HMGRclustalW{rosyperiwi} ..T..NCTTL GC..... AVPPPSVP  
 KIAPVVPQQP  
 HMGRclustalW{ tomato} ..P...ATTL GC..... AVPAPPAR  
 QIAPMAPPQP  
 HMGRclustalW{woodtobacc} ..P...ATTL GCT..... AVPPPPAL  
 QIVPMVPPQP  
 HMGRclustalW{ potato} ..PCAAATTL GC..... VVPPPPVR  
 KIAPMVPQQP  
 HMGRclustalW{radish} .....LVTC PPP..... PPP....S  
 QIVAAKLPNP  
 HMGRclustalW{arabadosis1} .....LVTC SPP..... TP.....  
 IVSVAKLPNP  
 HMGRclustalW{cucumismel} .....LIDN NRY..... AAPRSASA  
 VALPSKVDA  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertrel} .....LVTC PPA..... NISTKTTI  
 IAAPTKLPTS  
 HMGRclustalW{camptothec} .....TVP CAA..... APVDCPLP  
 PIKPKVVDPV  
 HMGRclustalW{arabados2} .....MIPC NQ..... SLDCREVL  
 PIKPNSVDPP  
 HMGRclustalW{chineseham} VIKPLVVETE SAS..... RATFVLG.A .SGTSPPVAA  
 RTQELEIELP

HMGRclustalW{chineseha2} VIKPLVVETE SAS..... .RATFVLG.A .SGTSPPVAA  
 RTQELEIELP  
 HMGRclustalW{syrianhamst} VIKPLVAETE STS..... .RATFVLG.A .SGGCSPVAL  
 GTQEPEIELP  
 HMGRclustalW{ rat} VIKPLVAEAE TSG..... .RATFVLG.A .SAASPPLAL  
 GAQEPGIELP  
 HMGRclustalW{ rabbit} VIKPLVAETD SPH..... .RAAFVVGGS .SFPDTSVL  
 ETKEPEIELP  
 HMGRclustalW{ human} VIKPLVAETD TPN..... .RATFVVGNS .SLLDTSSVL  
 VTQEPEIELP  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} VIKPLPLETS P..... .KAKFIVG.. .DSSPLELSP  
 EDKNTMFDLP  
 HMGRclustalW{sea urchin} PVTASPRNSR SSSPVSSHVS KPARFTIGSS GSGSEDEEEE  
 VIKEEEVEWV  
 HMGRclustalW{ cockroach} ETRDELTTTR GMDG.....W VEVSSPVEHK YVQTEQPSCS  
 APEQPLEEPP  
 HMGRclustalW{drosophila} LFTIEDQSSA N..... ..ASTQTDLL  
 PLRHRLVGPI  
 HMGRclustalW{dictyostel} .....SGKEQ EQ..... ..QQQQQQQQ  
 QQTPDITNQP  
 HMGRclustalW{schistosom} PKIKETLISD QVKQSPVLPK FSKKLNDIPL QSRKRIYCLH  
 KDDDYIDRND  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus VIKPLVAETE --S----- -RATFV-G-A -SA-PPPPA- -I-  
 PPEIELP

FIG. 32X

**00000000000000000000000000000000**

650	HMGRclustalW{methanobac}	.....	.....	.....	.....	MS.
...IMDDLME						
HMGRclustalW{methanococ}	.....	.....	.....	.....	.....	MEN
YNDILEKMLN						
HMGRclustalW{halobacter}	.....	.....	.....	.....	.....	MTD
AASLADRVRE						
HMGRclustalW{sulfolobus}	.....	.....	.....	.....	.....	MK.
IDEVVEKLVK						
HMGRclustalW{yeast2}	NNE.CVYALS	SQDEPIRP.L	SNLVELME..	..KEQLKNMN		
NTEVSNLVVN						
HMGRclustalW{yeast1}	SEEDDSRDIE	SLDKKIRP.L	EELEALLS..	..SGNTKQLK		
NKEVAALVIH						
HMGRclustalW{phycomyces}	.....	.....	.....	.....	.....	
.....						
HMGRclustalW{fusarium}	ANL.....	....PNRS.N	EELEKLLS..	..ENALREMT		
DEEVISLSMR						
HMGRclustalW{candida}	SEQ.....	....SSRP.L	EQVIELYK..	..DGKVKTLV		
DDEVVSLVTA						
HMGRclustalW{dictyoste2}	PNN.....	.....F	QRAVHIRR..	..KLLARDLQ		
KEHQRALHAQ						
HMGRclustalW{wheat1}	.....	.....	.....	.....	.....	
.....						
HMGRclustalW{rice}	G.....	.....	.....	.....	..GGMMEGD	
DEEIVAAVAS						
HMGRclustalW{corn}	AA.....	.....	.....A..	...PEKMPED		
DEEIVASVVA						
HMGRclustalW{wheat3}	.....	.....	.....	.....	.....	
.....						
HMGRclustalW{wheat2}	.....	.....	.....	.....	.....	
.....						
HMGRclustalW{soybean}	.....	.....	.....	.....	.....	
.....						
HMGRclustalW{rubbertre3}	.....	.....I	VSTTT.....	...TSTLSDD		
DEQIIKSVVS						
HMGRclustalW{rosyperiwi}	SK.....	.....MV.I	IEKPAPLI..	...TPQNSEE		
DEDIIKAVVA						
HMGRclustalW{tomato}	S.....	.....MS.M	VEKPAPLI..	...TSASSGE		
DEEIIKSVVQ						
HMGRclustalW{woodtobacc}	SKV.....	.....AA.M	SEKPAPLV..	...TPAASEE		
DEEIIKSVVQ						
HMGRclustalW{potato}	AKV.....	.....ALS.Q	TEKPSPII..	...MPALSED		
DEEIIQSVVQ						
HMGRclustalW{radish}	E.....	.....	.....	...QPPLPKE		
DEEIVKSVLD						
HMGRclustalW{arabadosis1}	EP.....	.....	.....IV..	...TESLPEE		
DEEIVKSVLD						
HMGRclustalW{cucumismel}	EA.....	.....	.....LN..	...TIPLPEE		
DEEVVKMVVD						
HMGRclustalW{rubbertre2}	.....	.....	.....	.....	.....	
.....						
HMGRclustalW{rubbertrel}	EP.....	.....	.....LI..	...APLVSEE		
DEMIVNSVVD						
HMGRclustalW{camptothec}	P.....	.....	.....I..	...SPPSSEE		
DEEIIKSVVE						
HMGRclustalW{arabados2}	RE.....	.....	.....	...SELDSE		
DEEIVKLVID						
HMGRclustalW{chineseham}	SE.....	.....PRP.N	EECLQILE..	SAEKGAKFLS		
DAEIIQLVNA						

25



0607

DEEIKLVVA

651

700

HMGRclustalW{methanobac} GR..IKLYEI E.RHVPVDEA VRIRREFIE. ....RTCGVK  
 ..LEHVSNYS  
 HMGRclustalW{methanococ} GE..IKPYQL D.KMFGSKIA TEIRRKFIE. ....KKVGIE  
 ..FKHICNYS  
 HMGRclustalW{halobacter} GD..LRLHEL E.AHADADTA AEARRLLVE. ....SQSGAS  
 ..LDAVGNYG  
 HMGRclustalW{sulfolobus} GE..ISFHEV D.NLLEANAA MVARRLALE. ....KIVGVG  
 ..LPSIGSTV  
 HMGRclustalW{ yeast2} G..KLPLYSL EKKLEDTTTRA VLVRRKALST LAESPILVS.  
 ...EKL PFRN  
 HMGRclustalW{ yeast1} G..KLPLYAL EKKLGDTTTRA VAVRRKALSI LAEAPVLAS.  
 ...DRLPYKN  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} G..KIPGYAL EKT LGDFTRA VKIRRSIIAR NKAAADITHS  
 LDRSKLPYEN  
 HMGRclustalW{ candida} G..KLPLYAL EKQ LGDNLRA VAIRRKALSD LADAPVLRS.  
 ...NKLPYLH  
 HMGRclustalW{dictyoste2} A..VVAAAEK AATSGEDPSS IQPVVPPTSN LDFEGSLTN.  
 ....LPVDH  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} G..ALPSHRL ESRLGDCRRA ARLRREALR. ....RVTGRG  
 ..VEGLPFDG  
 HMGRclustalW{ corn} G..KVPSYAL EARLGDCRRA AGIRREALR. ....RITGRD  
 ..IEGLPLDG  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} G..SIPSYSL ESKLGNCCKRA ALIRRETLO. ....RMSGRS  
 ..LEGLPLDG  
 HMGRclustalW{rosyperiwi} G..KIPSYSL ESKLGDCCKRA AGIRREALQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{ tomato} G..KIPSYSL ESKLGDCCKRA ASIRKEVMQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{woodtobacc} G..KMPSYSL ESKLGDCCKRA ASIRKEALQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{ potato} G..KTPSYSL ESKLGDCMRA ASIRKEALQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{radish} G..VVPSYSL ESRLGDCCKRA ASIRREALQ. ....RLTGRS  
 ..IEGLPLDG  
 HMGRclustalW{arabadosis1} G..VIPSYSL ESRLGDCCKRA ASIRREALQ. ....RVTGRS  
 ..IEGLPLDG  
 HMGRclustalW{cucumismel} G..SVPSYSL ESKLGDPCKRA ASIRREALQ. ....RTTGRS  
 ..IHGLPFEG  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} G..KIPSYSL ESKLGDCCKRA AAIRREALQ. ....RMTRRS  
 ..LEGLPVEG  
 HMGRclustalW{camptothec} G..TTPSYAL ESKLGDSHRA AAIRREALQ. ....RMTKKS  
 ..LAGLPLDG  
 HMGRclustalW{arabados2} G..TIPSYSL ETKLGDCCKRA AAIRREAVQ. ....RITGKS  
 ..LTGLPLEG  
 HMGRclustalW{chineseham} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.  
 ..LQYLPYRD

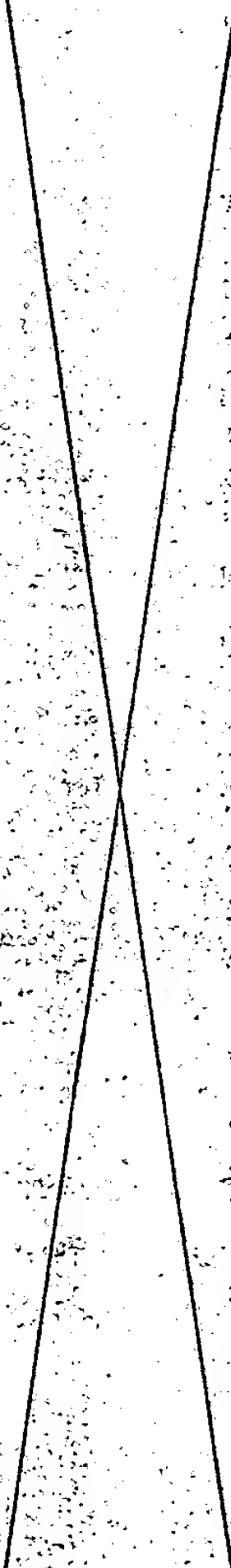
```

HMGRclustalW{chinese2} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.
..LQYLPYRD
HMGRclustalW{syrianhamst} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.
..LQYLPYRD
HMGRclustalW{ rat} K..HIPAYKL ETLMETHERG VSIRRQLLSA K..LAEPSS.
..LQYLPYRD
HMGRclustalW{ rabbit} K..HIPAYKL ETLMETHERG VSIRRQLLSK K..LPEPSS.
..LQYLPYRD
HMGRclustalW{ human} K..HIPAYKL ETLMETHERG VSIRRQLLSK K..LSEPSS.
..LQYLPYRD
HMGRclustalW{ mouse} .....
.....
HMGRclustalW{ xenopus} K..HIPAYKL ETMMESPREG VAIRRQMLSD K..LPQRSA.
..LQSLPYKN
HMGRclustalW{sea urchin} K..HIPAYKL ENILDNPERG VAVRRQIISK L..LPITDA.
..LEKLPYAS
HMGRclustalW{ cockroach} G..HIAGYQL EKVVRNPERG VGIRRQILTK T..ADLKDA.
..LDNLPYKN
HMGRclustalW{drosophila} GGTHCPLHKI ESVLDDPERG VRIRRQIIGS R..AKMPVGR
..LDVLPYEH
HMGRclustalW{dictyoste1} G..EVLAYRL ENELGDCSRA VEIRRMLLEK ....QLSKK.
..IEPIPHEG
HMGRclustalW{schistosom} G..RLKTREL ESVVRNPFRA VELRRDLS. ....TFLNNP
HIIERIPYKD
HMGRclustalW{archaeoglo} HYKSGKIRRA MSSRIPGFYK LSVEERLKKV AEFAGLSDEE
..VKAVLSQG
HMGRclustalW{pseudomonas} .....MS LDSRLPAFRN LSPAARLDHI GQLLGLSHDD
..VSLLANAG

Consensus G---IPSYSL ESKLGDCKRA VSIRREALSK K--LRITGSS --
LEGLPYEG

```

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750

29

30

62/78

VPMATTEGCL		
HMGRclustalW{sea urchin}	YDYSFVSGAC	CENVIGYMPV PVGVAGPLLL DGQ....EFQ
VPMATTEGCL		
HMGRclustalW{ cockroach}	YDYLKVMGAC	CENVIGYMPV PVGVAGPLNL DGR....LVH
VPLATTEGCL		
HMGRclustalW{drosophila}	FDYRKVLNAC	CENVLGYVPI PVGYAGPLLL DGE....TYY
VPMATTEGAL		
HMGRclustalW{dictyostel}	FDFAKVQGQC	CENVIGYVPI PVGTAGPIQL NGQ....LVT
IPMATTEGCL		
HMGRclustalW{schistosom}	YDYRLVYGQC	CEEVIGYMPI PVGKIGPLLL DGR....SHY
IPLATTEGCL		
HMGRclustalW{archaeoglo}	.LPLDVADRM	IENVIGTFEL PLGIATNFLI DGK....DYL
IPMAIEEPSV		
HMGRclustalW{pseudomonas}	ALPMDIANGM	IENVIGTFEL PYAVASNFQI NGR....DVL
VPLVVEEESI		

Consensus FDY-SVLG-C CENVIGY--I PVGVAGPLLL DGK----EYS

VPMATTEGCL

HMGCoA binding

E

090923.062001

FIG.32EE





**SECRET**

FIG. 32GG

801

850  
 HMGRclustalW{methanobac} NM..DALREE AESTTRHGKL VKIDPI.... IVAGSYVYPR  
 FVYTTGDSMG  
 HMGRclustalW{methanococ} NF..ERIKEV AESTTRHGKL IKIEPI.... LIVGRNLYPR  
 FVFKTGDMG  
 HMGRclustalW{halobacter} NF..AALKEA AEETTNHGEL LDVTP..... YVVGNSVYLR  
 FRYDTKDAMG  
 HMGRclustalW{sulfolobus} NL..EKIRNI ANSTSHHGKL KSITP..... FVLGNNVWLR  
 FSFETGDAMG  
 HMGRclustalW{ yeast2} EEGQNSIKKA FNSTSRFARL QHIQT..... CLAGDLLFMR  
 FRTTTGDAMG  
 HMGRclustalW{ yeast1} EEGQNAIKKA FNSTSRFARL QHIQT..... CLAGDLLFMR  
 FRTTTGDAMG  
 HMGRclustalW{phycomyces} EG.NDIVTNA FNSTSRFARL RKLKI..... ALAGKLVFIR  
 FSTTTGDAMG  
 HMGRclustalW{ fusarium} EAGQDMMKKA FNSTSRFARL QSMKT..... ALAGTNLYIR  
 FKTTTGDMG  
 HMGRclustalW{ candida} DEGQEEMKKA FNSTSRFARL QHLQT..... ALAGDLLFIR  
 FRTVTGDAMG  
 HMGRclustalW{dictyoste2} QENFYQVASA FNSTSRFARL KSIKV..... VIAGRLVYLR  
 FKSSTGDAMG  
 HMGRclustalW{wheat1} .....  
 .....GDAMG  
 HMGRclustalW{ rice} PANFELLA AV FNRSSRFGRL QDIRC..... ALAGRNLYMR  
 FSCITGDAMG  
 HMGRclustalW{ corn} PANFDTLSVV FNRSSRFGRL QGVQC..... AMAGRNLYMR  
 FSCSTGDAMG  
 HMGRclustalW{wheat3} .....  
 .....GDAMG  
 HMGRclustalW{wheat2} .....  
 .....GDAMG  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} PDNFDTIAVV FNKSSRFARL QSVQC..... AIAGKNLYMR  
 FSCSTGDAMG  
 HMGRclustalW{rosyperiwi} TQNFETISVV FNKSSRFAKL QSVQC..... AIAGKNLYIR  
 FSCSTGDAMG  
 HMGRclustalW{ tomato} PIKFESLANV FNQSSRFARL QRIQC..... AIAGKNLYMR  
 LCCSTGDAMG  
 HMGRclustalW{woodtobacc} PVKFETLAAV FNQSSRFARL QRIQC..... AIAGKNLYMR  
 FVCSTGDAMG  
 HMGRclustalW{ potato} PLNFETLSLM FNKSSRFARL QGIQC..... AIAGKNLYIT  
 FSCSTGDAMG  
 HMGRclustalW{radish} PENFETLAVV FNRSSRFARL QSVMC..... TLAGKNAYVR  
 FSCSTGDAMG  
 HMGRclustalW{arabadopsis1} PENFDTLAVV FNRSSRFARL QSVKC..... TIAGKNAYVR  
 FCCSTGDAMG  
 HMGRclustalW{cucumismel} PSNFDTLAVV FNRSSRFARL QSIRC..... SIAGKNLYVR  
 FCCSTGDAMG  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} PDNFDTLAVV FNKSSRFARL QGIKC..... SIAGKNLYIR  
 FSCSTGDAMG  
 HMGRclustalW{camptothec} PLNFETLAAV FNSSSRFGKL QNIKC..... AIAGKNLYMR  
 YSCSTGDAMG  
 HMGRclustalW{arabadops2} PSNFERLSLI FNKSSRFARL QSITC..... TIAGRNLYPR  
 FACSTGDAMG  
 HMGRclustalW{chineseham} PEGFAVIKDA FDSTSRFARL QKLHV..... TMAGRNLYIR  
 FQSKTGDMG

66/78

HMGRclustalW{chineseha2}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLVIR
FQSKTGDMG				
HMGRclustalW{syrianhamst}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLVIR
FQSKTGDMG				
HMGRclustalW{ rat}	PEGFAVVKEA	FDSTSRFARL	QKLHV.....	TLAGRNLVIR
LQSKTGDMG				
HMGRclustalW{ rabbit}	PEGFAVIKEA	FDSTSRFARL	QKLHI.....	SMAGRNLVIR
FQSRTGDMG				
HMGRclustalW{ human}	SEGFAVIKEA	FDSTSRFARL	QKLHT.....	SIAGRNLVIR
FQSRSGDMG				
HMGRclustalW{ mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{ xenopus}	AEGFKVIKDA	FDSTSRFARL	GRLQN.....	CVAGRNLVIR
FQSKTGDMG				
HMGRclustalW{sea urchin}	PENFAAIKER	FESTSRFAKL	KSIQT.....	ALAGRYMFLR
FKALTGDMG				
HMGRclustalW{ cockroach}	PYNFEQIKKN	FDSTSRFARL	SKIHI.....	RVAGRHLFIR
FIATTGDMG				
HMGRclustalW{drosophila}	DENYRVVKTE	FDSTSRFGRL	KDCHI.....	AMDGPQLVIR
FVAITGDRMG				
HMGRclustalW{dictyostel}	TDNYQALKAV	FDSTSRFARL	SAIKC.....	TIAGRSVYIR
FKCDTGDMG				
HMGRclustalW{schistosom}	EEGFQTLKSA	FDKTSAHVNL	LSVFA.....	CPAGRYIHIR
FAARTGDMG				
HMGRclustalW{archaeoglo}	EIIERANECD	PMLVNLGGGC	KDIEAR.VID	TIMGKMLIVH
LIVDVKDAMG				
HMGRclustalW{pseudomonas}	EIIELANRKD	QLLNSLGGGC	RDIEVHTFAD	TPRGPMMLVAH
LIVDVRDAMG				
	Consensus	PENFETLK-A	FNSTSRFARL	QSIQC----- AIAGRNLVIR
FSCSTGDMG				

NADH binding domain 1

(continued)

FIG. 32II

900  
 HMGRclustalW{methanobac} MNMVTIATER ALELLT...R ETGAHV..IA LSGNLCTDKK  
 PAAVNLIEGR  
 HMGRclustalW{methanococ} MNMVTIATEK ACNFIEGELK KEGIFVKTVA VSGNACVDKK  
 PSGMNLINGR  
 HMGRclustalW{halobacter} MNMATIATEA VCGVVE...A ETAASL..VA LSGNLCSDKK  
 PAAINAVEGR  
 HMGRclustalW{sulfolobus} MNMVTIAVEK VCEFIE.... ENFPSADCLA VSGNMCSDKK  
 QTNVNSLFGR  
 HMGRclustalW{ yeast2} MNMISKGVEY SLKQMVVEY. .GWEDMEVVS VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{ yeast1} MNMISKGVEY SLKQMVVEY. .GWEDMEVVS VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{phycomycs} MNM.....  
 .....  
 HMGRclustalW{ fusarium} MNMISKGVEH ALSVMANDG. .GFDDMQIIS VSGNYCTDKK  
 AAALNWIDGR  
 HMGRclustalW{ candida} MNMISKGVEY ALKQMTEVF. .GWDDMMVVS VSGNYCTDKK  
 PAAVNWINGR  
 HMGRclustalW{dictyoste2} MNMVSKGVEK ALEVITEY.. ..FPMEVLS LSGNVCTDKK  
 PSSINWLEGR  
 HMGRclustalW{wheat1} MNMVSKGVEN VLGYIRNN.. ..FPDMDVIS ISGNYCSDKK  
 ATAVNWIDGR  
 HMGRclustalW{ rice} MNMVSKGVEN VLGYLQNV.. ..FPDMDVIS VSGNYCSDKK  
 PTAVNWIEGR  
 HMGRclustalW{ corn} MNMVSKGVQN VLDFLQDD.. ..FHDMDVIS ISGNFCSDKK  
 PSAVNWIEGR  
 HMGRclustalW{wheat3} MNMISKGVQN VLDYLQDD.. ..FPDMDVIS ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{wheat2} MNMISKGVQH VLDYLEED.. ..FPDMDVVS ISGNFCSDKK  
 SAAVNWIEGR  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} MNMVSKAVQN VIDYLQND.. ..FPDMDVIG LTGNFCADKK  
 AAAVNWIEGR  
 HMGRclustalW{rosyperiw} MNMVSKGVQN VLEFLQTD.. ..YPDMDVLG ISGNFCADKK  
 PAAVNWIEGR  
 HMGRclustalW{ tomato} MNMVSKGVQN VLDYLQNE.. ..YPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{woodtobacc} MNMVSKGVQN VLDYLQNE.. ..YPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{ potato} MNMVSKGVQN VLDYLQSE.. ..YPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{radish} MNMVSKGVQN VLEFLTED.. ..FPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{arabadopsis1} MNMVSKGVQN VLEYLTDD.. ..FPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{cucumismel} MNMVSKGVQN VLEFLQHD.. ..FSDMEVIG ISGNFCADKK  
 PAAVNWIEGR  
 HMGRclustalW{rubbertre2} .....LESD.. ..FADMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{rubbertrel} MNMVSKGVQN VLEFLQSD.. ..FSDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{camptothec} MNMISKGVQN VLDFLQDD.. ..FPDMDVIG ISGNYCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{arabadops2} MNMVSKGVQN VLDFVKSE.. ..FPDMDVIG ISGNYCSDKK  
 ASAVNWIEGR  
 HMGRclustalW{chineseham} MNMISKGTEK ALLKLQEF.. ..FPEMQILA VSGNYCTDKK  
 PAAINWIEGR

0905723.06004

68/78

HMGRclustalW{chineseha2}	MNMISKGTEK ALLKLQEF.. ..FPEMQILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{syrianhamst}	MNMISKGTEK ALVKLQEF.. ..FPEMQILA VSGNYCTDKK
PAAVNWIEGR	
HMGRclustalW{ rat}	MNMISKGTEK ALLKLQEG.. ..VPELQILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{ rabbit}	MNMISKGTEK ALSKLHEY.. ..FPEMQILA VSGNYCTDKK
PAAVNWIEGR	
HMGRclustalW{ human}	MNMISKGTEK ALSKLHEY.. ..FPEMQILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{ mouse}	.....EK ALLKLQEF.. ..FPDMQILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{ xenopus}	MNMISKVTEQ ALARLQEE.. ..FPDLHVLA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{sea urchin}	MNMISKGTEQ ALHALQTM.. ..FPNIEIMS LSGNYCTDKK
VAAINWIEGR	
HMGRclustalW{ cockroach}	MNMLSKGTEV ALAYVQQV.. ..YPDMEILS LSGNFCTDKK
PAAVNWIEGR	
HMGRclustalW{drosophila}	MNMVSKALRW PFAEFTLH.. ..FPDMQIIS LSGNFCCDKK
PAAINWIKGR	
HMGRclustalW{dictyoste1}	MNMVSKGVEA VLEHLKII.. ..FDDMTLLS ISGNMCTDKK
PSSINWTEGR	
HMGRclustalW{schistosom}	MNMVSKATDS ALHCLKKY.. ..FSNMQVIS LSGNMCTDKK
PATINTILGR	
HMGRclustalW{archaeoglo}	ANAVNTMCEK VAPFIERITG .GKVYLRIIS NLAAYRLARA
KAVFDKDVIG	
HMGRclustalW{pseudomonas}	ANTVNTMAEA VAPLMEAITG .QQVRLRILS NLADLRLARA
QVRITPQQLE	
Consensus	MNMVSKGVEN VL--LQED-- -GFPDMDVIS ISGNYCTDKK
PAAVNWIEGR	

NADH binding domain 1 (concluded)

FIG. 32 KK



[illegible]

950

38

FIG. 32LL

70/78

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AG..SIGGYN
  HMGRclustalW{chineseha2} GKTVVCEAVI PAKVVREVLK TTTEAMIDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{syrianhamst} GKTVVCEAVI PARVVREVLK TTTEAMIDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      rat} GKTVVCEAVI PAKVVREVLK TTTEAMVDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      rabbit} GKTVVCEAVI PAKVVREVLK TTTEAMIDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      human} GKSVVCEAVI PAKVVREVLK TTTEAMIEVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      mouse} GKTVVCEAVI PAKVVREVLK TTTEAMVDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      xenopus} GKSVVCEAII PAKVVREVLK SSTEALVEVN INKNFIGSAM
AG..SIGGYN
  HMGRclustalW{sea urchin} GKSVVCEATV PAHIVQQVLK TSASALVDLN IHKNLVGSAM
AG..SIGGFN
  HMGRclustalW{cockroach} GKSVVCEAIV PADIISVLK TSVQALMDVN ITKNLIGSAV
AG..SIGGFN
  HMGRclustalW{drosophila} GKRVTTECTI SAATLRSVLK TDAKTLVECN KLKNMGGSAM
AG..SIGGNN
  HMGRclustalW{dictyostel} GRSVVCEAMI TGDVVQRVLK TNVQALVDLN IAKNLIGSAM
AG..SIGGFN
  HMGRclustalW{schistosom} GKSIVIAEHL SADVLAQVLH TNAQRLARLT HSKNWIGSAM
AGCPGMMGCN
  HMGRclustalW{archaeoglo} .....GEEVV EGIMLAYAFA AADPFRATH NKGIMNGISA
LM.....
  HMGRclustalW{pseudomonas} TAEFSGEAVI EGILDAYAFA AVDPYRAATH NKGIMNGIDP
LI.....

                Consensus GKSVVCEAVI PAEVVRKVLK TTVEALVELN ILKNLVGSAM AG--
SLGGFN

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K

FIG. 32MM

1000

**SECRET**

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.....EDLYI
  HMGRclustalW{chineseha2}  AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
  HMGRclustalW{syrianhamst} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
    HMGRclustalW{      rat}  LHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
    HMGRclustalW{      rabbit} AHAANYVTAI YIACGQDAAQ NVGSSNCITL MEASGPPN..
.....EDLYI
    HMGRclustalW{      human}  AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
    HMGRclustalW{      mouse}  AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
    HMGRclustalW{      xenopus} AHAANIVTAI YIACGQDAAQ NVGSSNCITI MEATGPTY..
.....EDLYI
    HMGRclustalW{sea urchin}  AHAANIVTAI YIATGQDAAQ NIASSNCMTL METRGPKG..
.....GDLYL
    HMGRclustalW{cockroach}  AHAANIVTAI FIATGQDPAQ NVGSSNCMTL MEPWGEDG..
.....KDLYV
    HMGRclustalW{drosophila}  AHAANMVTAV FLATGQDPAQ NVTSSNCSTA MECWAENS..
.....EDLYM
    HMGRclustalW{dictyoste1}  AHASNIVTAI FLATGQDCAQ NVESSNCITQ MEACNDG...
.....QDLYI
    HMGRclustalW{schistosom}  AHAANIIAGM FAATGQDLAQ VVDSSSCLTQ LEVDLSD...
.....DSLVA
    HMGRclustalW{archaeoglo}  ..... .IATGNDFRA IEAGAHSYAA IGG.YKPLTT
YEVDRKGNLV
    HMGRclustalW{pseudomonas} ..... .VATGNDWRA VEAGAHAYAC RSGHYGSLTT
WEKDNNHGLV

                                Consensus AHAANIVTAI FIATGQDPAQ NVESSNCITM MEAVNDGN-- -----
KDLHI

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D

1001

1050  
 HMGRclustalW{methanobac} AVNLPDVPLA TVGGGTGLET ASECLDIMGV RGGG.....  
 RVHFAEIVG  
 HMGRclustalW{methanococ} SVTLPDVPIG TVGGGTRVET QKECLEMLGC YGDN.....  
 KALKFAEIVG  
 HMGRclustalW{halobacter} SVSIASLEVG TVGGGTKLPT QSEGLDILGV SGGGDP.AGS  
 NADALAECIA  
 HMGRclustalW{sulfolobus} SVTLPSLEVG TVGGGTRLPT QKEALSIMGV YGSGNP.PGS  
 NAKKLAETIA  
 HMGRclustalW{ yeast2} SVSMPSIEVG TIGGGTVLEP QGAMLDLLGV RGPHTPEPGA  
 NARQLARIIA  
 HMGRclustalW{ yeast1} SVSMPSIEVG TIGGGTVLEP QGAMLDLLGV RGPHTAPGT  
 NARQLARIVA  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} SVSMPSLEVG TLGGGTILEP QGAMLDILGV RGSHTNPBGD  
 NARRLARIIG  
 HMGRclustalW{ candida} SVSMPSIEVG TIGGGTILDP QGSMLLELLGV RG.PADVPGE  
 NARQLAKIVA  
 HMGRclustalW{dictyoste2} SVTMPSIEVG TVGGGTHLPA QSACLDLLKI RGANLERPGA  
 NSEQLARVVA  
 HMGRclustalW{wheat1} SVTMPPIEV. ....  
 .....  
 HMGRclustalW{ rice} SVTMPSIEVG TIGGGTCLAS QAACLNLLGV KGSNHGSPGA  
 NAGRLATIVA  
 HMGRclustalW{ corn} SVTMPSIEVG TVGGGTQLAS QSACLDLLGV RGASRDRPGS  
 NARLLATVVA  
 HMGRclustalW{wheat3} SVTMPPIEV. ....  
 .....  
 HMGRclustalW{wheat2} SVTMPPIEV. ....  
 .....  
 HMGRclustalW{ soybean} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGS  
 NSRLLATIVA  
 HMGRclustalW{rubbertre3} SVSMPSIELG TVGGGTQLAS QSACLNLLGV KGASKDSPGS  
 NSRLLATIVA  
 HMGRclustalW{rosyperiwi} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKDSPGA  
 NSRLLATIVA  
 HMGRclustalW{ tomato} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANREAPGS  
 NARLLATVVA  
 HMGRclustalW{woodtobacc} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANREVPGS  
 NARLLATIVA  
 HMGRclustalW{ potato} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANRDAPGS  
 NARLLATIVA  
 HMGRclustalW{radish} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGM  
 NSRLLATIVA  
 HMGRclustalW{arabadopsis1} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASTESPGM  
 NARLLATIVA  
 HMGRclustalW{cucumismel} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGA  
 NSRLLATIVA  
 HMGRclustalW{rubbertre2} SVTLPSIEVG TVGGGTQLAS QSACLNLLGV MGACKESPGS  
 YSRLLATIVA  
 HMGRclustalW{rubbertre1} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANKESPGS  
 NSRLLAAIVA  
 HMGRclustalW{camptothec} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKEAPGS  
 NARLLATIVA  
 HMGRclustalW{arabadops2} SVSMPCIEVG TVGGGTQLAS QAACLNLLGV KGSNNEKPGS  
 NAQQLARIVA  
 HMGRclustalW{chineseham} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE  
 NARQLARIVC



HMGRclustalW{chineseha2} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE  
 NARQLARIVC  
 HMGRclustalW{syrianhamst} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE  
 NARQLARIVC  
 HMGRclustalW{ rat} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE  
 NARQLARIVC  
 HMGRclustalW{ rabbit} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDSPGE  
 NARQLARIVC  
 HMGRclustalW{ human} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE  
 NARQLARIVC  
 HMGRclustalW{ mouse} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE  
 NARQLARIVC  
 HMGRclustalW{ xenopus} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGASTETPGK  
 NACQLAQIVC  
 HMGRclustalW{sea urchin} SCTMPSIEIG TVGGGTNLLP QSACLQMLGV KGSNIHGSGL  
 NASQLARIVC  
 HMGRclustalW{ cockroach} SCTMPSIEIG TIGGGTVLPP QAACLDMLGV RGANEMCPGE  
 NANTLARIVC  
 HMGRclustalW{drosophila} TCTMPSIEVG TVGGGTGLPG QSACLEMLGV RGAHATRPGE  
 NAKKLAQIVC  
 HMGRclustalW{dictyostel} TVTMPSIEVG TVGGGTSLPA QSACLDIIGV KGSSSSKPGA  
 NADQLAKTIA  
 HMGRclustalW{schistosom} SVTMPCLEVG TVGGGTSLPG QRACLDLLDL SV.....D.R  
 PTEHLSRIIA  
 HMGRclustalW{archaeoglo} GTIEIPMAVG VIGGATKVN LAKISLKILG VNTAEELARV AAAL  
 HMGRclustalW{pseudomonas} GTLEMPMPVG LVGGATKTHP LAQLSLRILG VKTAQALAEI AVAV  
  
 Consensus SVTMPSIEVG TVGGGTQLAP QSACLNLLGV KGA-KESPGS  
 NARQLARIVA

NADH binding domain 2

1051

1100

HMGRclustalW{methanobac} GAVLAGELSL MGALAAGHLA RAHSELGRG. ....  
 .....  
 HMGRclustalW{methanococ} AAVLAGELSL LGALAAGHLG KAHQELGR.. ....  
 .....  
 HMGRclustalW{halobacter} VGSLAGELSL LSALASRHLS SAHAELGR.. ....  
 .....  
 HMGRclustalW{sulfolobus} STVLSGELNL LAALSNKELG KAHAKLGRAM KV.....  
 .....  
 HMGRclustalW{ yeast2} CAVLAGELSL CSALAAGHLV QSHMTHNRK. ..TNKANELP  
 QPS.....  
 HMGRclustalW{ yeast1} CAVLAGELSL CAALAAGHLV QSHMTHNRKP AEPTKPNNLD  
 ATDI.....  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} AAVLAGELSL CSALAAGHLV RAHMQHNRSA APSRSTTPGS  
 SHDARLTGHD  
 HMGRclustalW{ candida} SIVLSGELSL VSALAAGHLV QSHMQHNRAA AKK.....  
 .....  
 HMGRclustalW{dictyoste2} AAVLSGELSL MSALAAGHLV RSHLKHNKRT EAPAPQADTI  
 SMTHNLPHSD  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} GSVVAGRALL LAALASGHLV KSHMMYNRSS KDVAK.....  
 .....  
 HMGRclustalW{ corn} GGVLAGELSL LSALAAGQLV KSHMKYNRSS KDVSS.....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} GSVLAGELSL MSAIAAGQLV NSHMKYNRSS KDVTK.....  
 .....  
 HMGRclustalW{rubbertre3} GSVLAGELSL MSAIAAGQLV NSHMKYNRSA KDVSK.....  
 .....  
 HMGRclustalW{rosyperiwi} GSVLAGELSL MSAISAGQLV RSHMKYNRSS KDITN.....  
 .....  
 HMGRclustalW{ tomato} GSVLAGELSL MSAISSGQLV NSHMKYNRST KDVTK.....  
 .....  
 HMGRclustalW{woodtobacc} GSVLAGELSL MSAISAGQLV KSHMKYNRST KDVTK.....  
 .....  
 HMGRclustalW{ potato} GSVLAGELSL MSAISAGQLV KSHMKYNRSI KDISK.....  
 .....  
 HMGRclustalW{radish} GAVLAGELSL MSAIAAGQLV RSHMKYNRSS RDISG.....  
 .....  
 HMGRclustalW{arabadopsis1} GAVLAGELSL MSAIAAGQLV RSHMKYNRSS RDISG.....  
 .....  
 HMGRclustalW{cucumismel} GSVLAGELSL MSAIAAGQLV RSHMKYNRSS RDVSK.....  
 .....  
 HMGRclustalW{rubbertre2} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS KDVSK.....  
 .....  
 HMGRclustalW{rubbertrel} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS KDMSK.....  
 .....  
 HMGRclustalW{camptothec} GSVLAGELSL MSAIAAGQLV NSHMKYNRSN KDVTK.....  
 .....  
 HMGRclustalW{arabadops2} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS RDIGP.....  
 .....  
 HMGRclustalW{chineseham} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....

76/78

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.....
HMGRclustalW{chinese2} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{syrianhamst} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{      rat} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{      rabbit} GTVMAGELSL MAALAAGHLV KSHMIHNRSK INLQD.....
.....
HMGRclustalW{      human} GTVMAGELSL MAALAAGHLV KSHMIHNRSK INLQD.....
.....
HMGRclustalW{      mouse} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{      xenopus} STVMAGELSL MAALAAGHLV KSHMVHNRSK INLQD.....
.....
HMGRclustalW{sea urchin} ATVMAGELSL MSALAAGHLV KSHMKHNRSA LNIASPLPSI
DEVATHRRSK
HMGRclustalW{cockroach} GTVLAGELSL MSALAAGHLV KSHMRHNRSS VSTSG.....
.....
HMGRclustalW{drosophila} ATVMAGELSL MAALVNSDLV KSHMRHNRSS IAVNSAN...
.....
HMGRclustalW{dictyostel} SAVMAGELSL MSALSAGHLM KSHLQYNRAK TN.....
.....
HMGRclustalW{schistosom} GTVLAAELSL MAALDTDDLK KAHMHFNRAK QSTNSHSCSH
STTTDNNDNI
HMGRclustalW{archaeoglo} ..GLAQNFAG LRALATEGIQ RGHMELHARN LAIMAGATGD
EVDRVVEIMV
HMGRclustalW{pseudomonas} ..GLAQNLGA MRALATEGIQ RGHMALHARN IAVVAGARGD
EVDWVARQLV

Consensus GTVLAGELSL MSALAAGHLV KSHMK-NRSS KDVSK-----

```

\* †††

FIG. 32 SS

77/78

1101

1152  
 HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} ..... ..NKGPPCKT SALL.....  
 .....  
 HMGRclustalW{ yeast1} ..... ..NRLKDGSV TCIKS.....  
 .....  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} QCPRALSVNN VDERRRYSEV KAIDE.....  
 .....  
 HMGRclustalW{ candida} .....  
 .....  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} .....A .....AS.....  
 .....  
 HMGRclustalW{ corn} .....T .....TATEK TRQREVDV..  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....I .....S.....  
 .....  
 HMGRclustalW{rubbertre3} .....I .....TF.....  
 .....  
 HMGRclustalW{rosyperiwi} .....I .....ASSQL ESDS.....  
 .....  
 HMGRclustalW{ tomato} .....A .....SS.....  
 .....  
 HMGRclustalW{woodtobacc} .....A .....SS.....  
 .....  
 HMGRclustalW{ potato} .....  
 .....  
 HMGRclustalW{radish} .....A .....TTTT.....  
 .....  
 HMGRclustalW{arabadopsis1} .....A .....TTTTT TTT.....  
 .....  
 HMGRclustalW{cucumismel} .....L .....ES.....  
 .....  
 HMGRclustalW{rubbertre2} .....A .....AS.....  
 .....  
 HMGRclustalW{rubbertrel} .....A .....AS.....  
 .....  
 HMGRclustalW{camptothec} .....A .....SS.....  
 .....  
 HMGRclustalW{arabadops2} .....S .....SQVNR .....  
 .....  
 HMGRclustalW{chineseham} ..... ..LQGTCTK KSA.....  
 .....

0985723 "062001  
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78/78

HMGRclustalW{chineseha2} ..... LQGTCTK KSA.....  
 .....  
 HMGRclustalW{syrianhamst} ..... LQGTCTK KAA.....  
 .....  
 HMGRclustalW{ rat} ..... LQGTCTK KAA.....  
 .....  
 HMGRclustalW{ rabbit} ..... LEGACTK KAA.....  
 .....  
 HMGRclustalW{ human} ..... LQGACTK KTA.....  
 .....  
 HMGRclustalW{ mouse} ..... LQGTCTK KAA.....  
 .....  
 HMGRclustalW{ xenopus} ..... LPGTCTK KAA.....  
 .....  
 HMGRclustalW{sea urchin} SVDFSALKES SAAAPGTCTA NAS.....  
 .....  
 HMGRclustalW{ cockroach} .....S ...EPSTPAC KS.....  
 .....  
 HMGRclustalW{drosophila} .....NP LNVTVSSCST IS.....  
 .....  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} SNIYDNHNVA LSSKIPVTDN SDIRESVHSL HVKPFVPKSD  
 LSVNPEISHY TM  
 HMGRclustalW{archaeoglo} RDGKIRLDYA KEVLRLRS. ....  
 .....  
 HMGRclustalW{pseudomonas} EYHDVRADRA VALLKQKRGQ .....  
 .....  
 Consensus -----A ---LQGTCTK KAA-----  
 -----

Figure 1: ClustalW alignment of forty-three non-redundant HMG-CoA reductase sequences to represent archaeobacterial, eubacterial, fungal, plant and animal groups. The putative functional domains in the alignment marked as described below are based on the three dimensional structure of *Pseudomonas mevalonii* HMGR (Lawrence et al., 1995): boxed-HMGCoA binding domain, light shade-NAD(H) binding domain, underlined consensus- domains involved in catalysis, \* underneath consensus and boldface-key histidine residue involved in catalysis. The putative phosphorylation site residues are marked with ‡ and boldface, and are located at the C-terminal region of the protein, adjacent to a highly conserved arginine, marked with † and boldface. Also indicated are the conserved Glu (E), Lys (K), and Asp (D) residues, marked by E, K, and D, respectively. These residues are thought to be critical in catalysis, based on the crystal structure (Tabernero et al., 1999).

FIG. 32uu